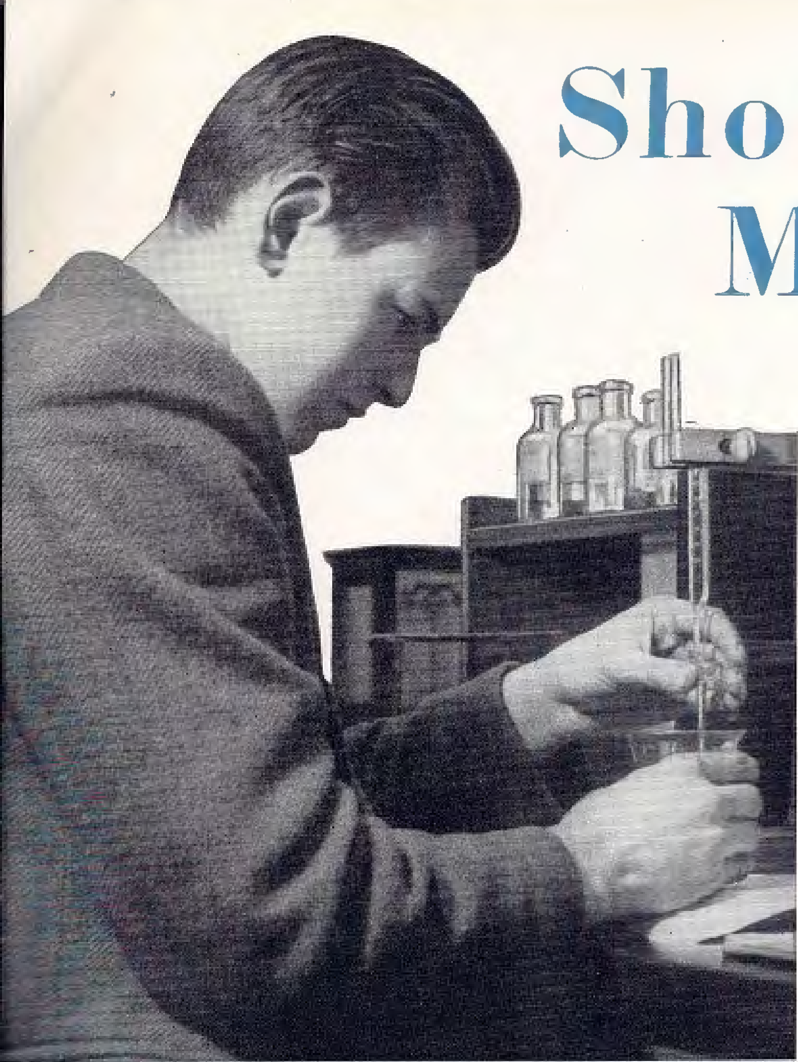
MAGAZINE

PRICE TWOPENCE

APRIL 1950



Should I Encou
My Son to be

By Dr. A. W. Baldwi

THE I.C.I. MAGAZINE

VOLUME 28 NUMBER 162 APRIL 1950

The *I.C.I. Magazine* is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. It is edited by Henry Maxwell and printed at The Kynoch Press, Birmingham, and is published every month by Imperial Chemical Industries Limited, 26 Dover Street, London, W.1. Telephone: REGent 5067–8.

CONTENTS

The Editor is glad to consider articles for publication. Payment will be made for accepted contributions.

Before I say anything at all on this subject I should make it quite clear that I am not going to attempt to encourage my own son to become a chemist, for the simple reason that he has already decided otherwise. I think I could *persuade* him to consider chemistry if I were to try really hard, but I am quite sure that I should be doing wrong if I did. The operative word in the title of this article is "encourage," not "persuade": "encourage" implies that there is already a leaning towards chemistry as a subject. Which brings us to the first essential, namely that your son must have a liking for chemistry and that he must be quite sure of it. If there is any uncertainty in this, then for goodness' sake think of something else for him. There are far too many so-called chemists who might have carved out really useful careers for themselves if they had honestly faced up to that question in the beginning.

The chemical profession plays—and will continue to play, as far as I can see—an essential role in modern civilisation and could lead your son to any one of a wide variety of interesting careers. He will not make a fortune, unless he goes into business on his own account, but he should certainly be able to provide a comfortable living for himself and a family even though his early struggles, as in most professions, may be hard. So let us consider how he should go about it and let us take a look at some of the careers which would be open to him as a chemist. Incidentally, while we are talking about sons we might at the same time include daughters. Women are late-comers to the chemical profession and apart from one or two quite remarkable cases have not yet made their mark in chemistry. It is far too early, however, to decide whether women can hold their own, and the next generation might find women as firmly established in the chemical as they are in the medical profession. The doors are open to women, and there is no reason why you should not encourage your daughter to be a chemist if she is keen and shows promise. For convenience in phraseology, however, I shall continue to confine my observations to the career of your son.

As soon as he has decided that he wants to be a chemist he should realise that there is a series of clearly defined targets before him, targets which he must hit with certainty if he is ultimately to become qualified—and he must become qualified. Provided he has the right stuff in him, this phase of his career is the simplest and most straightforward. The objective is clear and definite, and he must let nothing stand in his way to attain it. Later, when he has put this phase behind him and has embarked on his professional career, he may sometimes find it difficult to decide what his next aims should be. It is then that his character, which will define the pattern of his ultimate career, will become apparent. But we'll talk about that later.

The first target is School Certificate. The rules

rage
a Chemist?

(Dyestuffs Division)

governing School Certificate are shortly to be changed, but there is no point in my going into that matter here. You can get it all from your boy's headmaster. But, whatever the new rules may be, your son must do well in chemistry. The next target is Higher School Certificate, and it is well worth while to keep your boy at school up to the age of 17 or 18 until this stage is reached, making a sacrifice if need be.

The best thing then would be for him to go to a university and to take a degree with honours in Chemistry. Some people would specify Oxford or Cambridge as the university, and while nobody would quarrel with such a recommendation I merely interject that these lofty seats of learning are not so essential to the study of chemistry as they might be for some other subjects. Many of the provincial and Scottish universities have excellent, indeed famous, chemistry schools, and their degrees are recognised and respected the world over. The standing of a chemistry school lies in the reputations of the professor and his staff, arising from the research they have done or are doing. The tradition of the school—and tradition is important too—is derived from the great men who have been associated with it. While the chemistry schools of Oxford and Cambridge have illustrious records, as you might expect, they have no monopoly of the great names. Manchester, as a typical "red brick" university, can claim Frankland, Schorlemmer, Perkin Junior and, in more modern times, Robinson.

Suppose, however, that you cannot afford to send him to a university, which is the case more often than not. Then you must arrange for him to have a crack at a scholarship, and here again your boy's headmaster can provide all the advice and guidance you need. It might turn out, however, that he fails to get a scholarship: the competition is pretty fierce these days. Even so, it would nevertheless be the height of folly to abandon the whole idea merely because of such a setback, and it would be quite wrong to conclude that your lad is a second-rater. Youths and young men change considerably between the ages of 15 and 25–30, and there are many cases of boys showing but middling ability growing into men with first-class brains. The reverse is, unhappily, also true.

If you can't get him into a university one way or another, then the only course open to him is to get a job as a laboratory assistant in the chemical industry with a view to taking a London external degree by private study. Many men in responsible positions have started in this way. It is a hard way, of course, but nothing like so hard as it was twenty-five years ago, and it does bring out the best in a chap. Moreover, he will be earning a living.

There is an equally important point relating to the science itself. A first-class chemist must be a first-class practitioner or laboratory craftsman. Mere book learning is not enough. And the man who is trained in industry, while there may be occasional gaps in his practical experience, is generally speaking likely to be a better laboratory man than the university student. This is of great importance if he intends to be a research chemist.

This brings your son to his early twenties with a degree in chemistry. The time will then have come for him to make a most important decision, and he should arrive at that decision only after careful thought. It will affect his entire career henceforward. He must decide

A training class for young laboratory assistants in the General Chemicals Division Research Department

One of the many well-equipped I.C.I. laboratories in which a chemist has great possibilities before him

calmly and without any self-deception just how keen he is on chemistry as chemistry and just how good he is. He must decide whether pure chemistry is adequate for the attention of all his mental energy from now on or whether he wishes to use his chemistry as a stepping stone to other activities. In the former case he should choose a university career or go in for industrial research. In the latter, a variety of alternatives is open to him.

If he chooses research he must first do research at a university, generally under the personal direction of the professor, and proceed to the degree of Ph.D. This generally takes about three years, and it is possible to get financial aid to keep body and soul together while doing it. This is also possible to the man who started life as a laboratory assistant in industry, depending, as it does for all, on how well he did in his degree examination. The man who decides to follow an academic career then stays on at the university, living with the aid of research grants, exhibitions, and so forth, until he lands a job as lecturer at his own or some other university. The ultimate goal then is to attain the summit of his profession, the professorial chair, which he can reach via the stepping stones of senior lectureship and university readership. But he must inevitably be prepared to move around somewhat, even as far afield as to the Dominions, as he climbs the ladder.

The alternative is to go into industrial research, a wise choice for the man who, although keenly devoted to his chemistry, feels that the university atmosphere is a little too rarefied for his more restless spirit. This, as well as providing him with a somewhat more worldly setting for his livelihood, does provide opportunities for him to abandon research for more suitable activities if he should feel so inclined later on in life. This is important, since a man might quite easily have a radically different outlook at 35 from what he had at 25. The chief attraction of industrial research, however, is the possibility—it is much more than a possibility, in fact—of seeing tangible evidence of industrial progress, whether it be a new product or an improved process, arising directly from one's own researches.

But to return to your son. By the time he has got his degree he may have decided that pure chemistry and research are not his line of country. He wants chemistry plus something else in the hope that the something else may provide opportunities for other personal qualifications he may have over and above his chemistry. He may have an urge to teach, for example. If that is so, then the road into the teaching profession is very clearly signposted; there is a grave shortage of science teachers, a shortage which will continue for several years. If, on the other hand, he has a flair for writing, then scientific journalism, either as a freelance or as a regular member of the staff of one of the big dailies, is an attractive possibility. Beyond all this, however, a variety of opportunity is offered by the chemical industry.

The thing to realise is that the chemical industry has many different features, and all of these call for the attention of chemists of one sort or another. It is true that, like every other industry, it needs accountants, secretaries, a distribution department and so forth, and it is true that these specialists do not need to be chemists. But apart from these people most of the staff are chemists. Further to research, which I have already mentioned, there are the functions of manufacture, customer service and sales. These together with research constitute the four main pillars upon which the entire structure of any chemical firm depends.

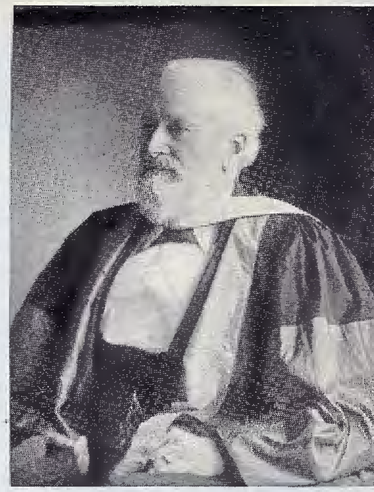
The importance of chemical manufacture needs no emphasis, and it is also obvious that it must be controlled

by chemists. If your son decides to be a works chemist he will need in good measure certain qualities other than a sound knowledge of chemistry, important though that is. Right at the beginning he will be concerned with the management of personnel, in a small way at first but in ways never encountered by the research chemist. He will need to direct the activities of a small group of chemical processmen, and to do this properly, dealing with the attendant human and psychological problems, calls for special qualities of level-headedness, good judgment—common sense if you like. When your son becomes a works manager, a position to which he will undoubtedly aspire, he will direct the industrial lives of hundreds—possibly thousands—of people; and a very mixed bunch they will be, chemists, engineers, clerks, processmen, tradesmen, and labourers—a heavy responsibility for which he must begin to prepare himself from the start of his career.

The chemical industry is closely linked with the technological industries, who are in fact its customers. I refer to those industries dealing with the manufacture of textiles, rubber, paints, plastics, leather and paper, and to the dyeing and printing industries. The science of any one of these industries is generally referred to as a technology. It is in fact applied chemistry and is best approached on the basis of a sound knowledge of chemistry. Your son would be well advised to give careful consideration to the technologies. There are, of course, opportunities in the industries themselves, but the chemical industry, being so intimately concerned with the technological trades (I.C.I., for example, is concerned with all of them), also needs to carry its own technologist staff. The life of the technologist in the chemical industry is closely bound up with the industry's customers, with whom he is the technical link. He speaks the customer's language and knows what he needs. This he conveys and interprets to the research department, setting the targets for new products, and to the manufacturing department, setting the standards acceptable to the customer. To do this job he needs to travel, both in Britain and abroad. It may be necessary, for example when a new dyestuff is launched, to instruct wool dyers in Yorkshire as to how it should be applied and later to do the same thing in Australia.

It follows logically that the control of sales should be in the hands of technologists, and it is among such specialists that the sales department finds its senior executives. A job in the overseas sales department might lead to your son taking up residence in such far-away places as Colombia, Argentina, Egypt or India.

So, gentle reader, if your son chooses chemistry as his career there are many roads he can take, and twenty years from now he could be in any one of a number of situations differing amazingly from one another. He could be a university lecturer in Leeds or Adelaide, an industrial research chemist with two or three priceless new drugs to his credit, the manager of a chemical factory in Scotland, or a textile printing technologist on a tour of print works in Canada. But wherever he is he will be doing something well worth while, for there is one thing one can say about chemistry. It is essential to modern living. So that if you ask me whether you should encourage your son to become a chemist I should say that, if he is as keen as I think he should be, he probably won't need any encouragement. I know I didn't—and I've never regretted it.



Dr. Frankland

(ABOVE) *W. H. Perkin, Jr.*

(LEFT) *Dr. Schorlemmer*

Sir Robert Robinson, O.M.

(Portraits by courtesy of The Chemical Society)

I.C.I. NEWS

ALKALI DIVISION

Mr. Frederick Taylor

One of Silvertown's last remaining links with the early days of Brunner, Mond was recently severed by the death, at the age of 73, of Mr. Frederick Taylor. He was the son of Mr. Martin Taylor, who joined Brunner, Mond and Co. in the early days after being engaged in the manufacture of alkali at Widnes before the firm was established.

Mr. Taylor spent his first working years in Brunner, Mond's Victoria Street office, London, where (as he used to recall with much amusement) he had in 1898 to check the applications for tickets for the company's Twenty-Fifth Anniversary celebrations at Silvertown. He could not understand why a contingent of 622 processmen from Winnington were bringing with them no fewer than 726 wives and 90 sweethearts, until the Winnington office, in reply to his urgent enquiry, explained that a large number of them were relatives and friends of men working on the afternoon shift who would be unable to be present themselves!

In 1902 he was transferred to Silvertown and a few years later went with his father to open up the Lombard Street office which later moved to Cavendish Square. He returned to Silvertown in 1927 as London Sales Manager, a post which he held until his retirement five years later.

DYESTUFFS DIVISION

Dr. P. Dootson

Dr. P. Dootson, of Grangemouth Works, who retired on 31st December, 1949, is one of that well-known group of chemists who joined the Company some thirty years ago and who have helped in no small way to make Dyestuffs Division what it is today.

After graduating at Manchester University Dr. Dootson went to Berlin University to carry out under Professor Ullman post-graduate research which included some of the very early work on acridone dyestuffs. Interned in Germany throughout the 1914–18 war, he joined the dyestuffs industry at Blackley in 1919. In 1931 he was transferred to the Research Department at Grangemouth, where he remained until his retirement. During the whole of his working life Dr. Dootson specialised in the field of anthraquinone dyestuffs, and quite a number of the processes now used on the manufacturing scale are the result of his research.

In private life Dr. Dootson, in addition to being a more than useful golfer, is a keen and good bridge player.

Making a presentation on behalf of his colleagues, Mr. C. Paine, Division Research Director, paid warm tribute to Dr. Dootson's work and achievements and expressed the good wishes of his many friends for a long and happy retirement.

Mr. C. Paine, Dyestuffs Division Research Director, makes the presentation to Dr. Dootson (left)

GENERAL CHEMICALS DIVISION

Widnes Centenary Celebrations

The establishment of chemical manufacturers in Widnes dates from the middle of the nineteenth century, when four men, James Muspratt, John Hutchinson, William Gossage and John McClellan, each set up a chemical works in the town. These pioneers were soon followed by others, and many of the chemical works thus established later became merged into the United Alkali Company and later still into I.C.I. The Board of I.C.I. has therefore decided that in this year 1950 there shall be a celebration of the completion of one hundred years of chemical industry in Widnes, in which all employees and pensioners, together with their wives and families, of the Widnes Works of the General Chemicals Division shall take part.

Although much detail planning has yet to be done the general arrangements have already been settled, and it can now be announced that the main feature of the celebrations will be a grand fête to be held on Saturday, 10th June, in the grounds of the I.C.I. Widnes Recreation Club. For those shiftworkers (and their families) whose turn of duty prevents their attending the fête there will be a day's outing to Belle Vue on Wednesday, 14th June.

Everyone who will be concerned with these celebrations (including that all-important official, the Clerk of the Weather) will no doubt be glad to have this early information about an occasion which, it is hoped, will be a memorable one.

Long Service at Wednesbury

Of the 50 adult members of Wednesbury Works no fewer than 24 have an average service of more than 37 years and seven of these an average of 44 years—a proud record of service.

Mr. W. Lyons

With the sudden death on 5th February of Mr. W. Lyons, General Chemicals Division's Cassel Works at Billingham have lost a great and valued friend who has also had a distinguished career in the public service and the trade union movement. Our correspondent writes:

"Few men have worked so hard or so unselfishly for causes in which they believed as Bill Lyons. It is said by those who knew him that he worked himself to death. Before coming to Billingham 22 years ago Bill Lyons had worked as a coal-miner for nearly fourteen years. Starting in the Anhydrite Mine, he afterwards worked on Oil Works construction, in Engineering Works (Services), and from 1936 until his death he was a processman at Cassel Works.

"With a break of only one year—1944—he has served on Cassel Works Council for the past eight years. He was a member of Synthonia Executive Council for many years and represented his works and Division on the Division and Central Councils. Last year he was elected to represent the Chiltons Ward of the Billingham Urban District Council. Throwing himself into the work of local government with the same enthusiasm he had shown in everything else he tackled, he served on committees for Housing, Highways, General Purposes, Allotments and Horticulture.

"Throughout his working life Bill Lyons was an ardent trade unionist. As a coal-miner he had been a member of the Durham Miners' Union and at the time of his death he had completed twenty years' membership of the Transport and General Workers Union. He was a shop steward, a convenor, union branch secretary for Cassel Works, chairman of the District Committee of the T. & G.W.U. and a member of the area committee.

"He achieved one of his lifelong ambitions when he was recently appointed temporary district organiser of the union to which he had given such devoted service. Proudly conscious of the additional responsibilities with which he would be faced, Bill Lyons looked forward eagerly to the day when he was due to take up his new duties—the day following his death."

Cassel Production Records

The BC Section of Cassel Works last year broke all their previous records with their output of packed liquid chlorine, hydrochloric acid and sodium hypochlorite. To celebrate these achievements two informal socials were held to which members of the Services, Workshops, Laboratories, Instruments and Electrical Sections, who contributed so much behind the scenes, were invited to join their colleagues of the BC Section. The entertainment included a film show, conjuring and impromptu sketches by the guests.

NOBEL DIVISION

A Special Award

At the end of every year the Ardeer Factory Awards Committee meets to review all the successful ideas submitted under the Suggestions Scheme and to award a special prize for the best suggestion of the year. This year £10 has been awarded to Mr. Alexander McLatchie, fitter in Blasting Department, for suggesting seven alterations in the design of a machine used in the cartridging of powder blasting explosives.

Mr. A. McLatchie

Mr. J. Laing

The death of Mr. James Laing, a former chairman of the explosives group, took place on 11th February. Mr. Laing joined Nobel's Explosives Co. Ltd. in 1893. He was Explosives Group managing director from 1931 to 1936 and Explosives Group chairman from 1936 to 1942, retiring in May of that year.

Mr. J. Robinson, joint managing director of Nobel Division, who was Mr. Laing's colleague for many years, writes:

"The sudden passing of Mr. James Laing on 11th February ended a life closely identified with the fortunes of Nobel's Explosives Co. Ltd., Nobel Industries Ltd. and what is now the Nobel Division of I.C.I.

"He joined Nobel's as a boy in 1893, and, as he did not retire until 1942, he had the goodly total of 49 years of service with the Company. After some years as a junior he was put in

charge of the sales of sporting ammunition in the days when competition was very keen between Eley's, Kynoch's and Nobel's. From there he moved to the wider sphere of explosives home sales. When Nobel Industries was formed after the 1914–18 war he became Sales Manager (Explosives) for the merged companies. With the formation of I.C.I. he advanced to the post of managing director of the Explosives Group, and eventually, in 1936, was appointed chairman of the board of what is now Nobel Division.

"Although at the outbreak of war in 1939 he was approaching retirement, he assisted in the war effort until 1942, when the strain of the times and the effect of the loss of his younger daughter after a long illness taxed his strength unduly.

"Few who knew James Laing can have anything but kindliest recollections of him. Impulsive he was at times, and therefore liable to be misunderstood by those who knew him only superficially, but no one in trouble, business or personal, ever failed to meet with a ready response from him in the form of advice and assistance. To those who had the privilege of working closely with him, his death has come as a real personal loss."

Mr. Laing is survived by his wife, now living in Glasgow, by his elder daughter, at present in Tanganyika, and by his son, Mr. James M. Laing, who is a member of the staff of African Explosives and Chemical Industries Ltd.

Five Times Champion

Playing in the final of the Ayrshire Individual Draughts Championship at Kilmarnock on 4th February, Mr. Neil T. Byars, engineering fitter at Ardeer, defeated Mr. W. Galloway in one of the shortest finals ever played in the county. Mr. Byars won easily with two victories and one draw in the three games played. He thus becomes Ayrshire Draughts Champion for the fifth consecutive time.

Nineteen Years with the "Specials"

Mr. J. Owen, Cartridging Foreman at Roburite, who served throughout the war with the Lancashire County Police Special Constabulary, recently received a bar to his Long Service medal in recognition of 19 years' service with the force. As a Section Commander in the "Specials," he has responsibilities covering a wide area.

METALS DIVISION

Great Lengths for Dollars

More than a thousand cupro-nickel tubes, probably the largest in diameter and almost the longest tubes of their kind ever made in this country, left Allen Everitt Works on 23rd February on the first stage of their journey across the Atlantic to Montreal. The tubes, which are more than 50 ft. long and ⅝ in. in diameter, will be used in water heaters for a Canadian electric power plant.

This unusual dollar-earning order was obtained in competition with American tube makers and was completed before the time-limit of six weeks despite the fact that, because of the great length of the tubes, much of the work had to be done after the day's normal production was over. Mr. A. H. Hemus, works manager, has paid tribute to the men who worked unusually long hours in getting the tubes ready on time.

Mr. Ambrose Hopper

The death of Mr. Ambrose Hopper, formerly managing director of I.C.I. (Metals), is recorded with deep regret. He died on 24th January at the age of 78.

Mr. Hopper, who came from Stockton-on-Tees, joined Elliott's Metal Co. Ltd. in 1897, and, after serving successively as chief cost clerk and secretary became general manager of the Elliott Group of firms in 1919 and two years later managing director. After the merger of these firms into the Metals Group of I.C.I. in 1928 he was appointed to the joint executive board as managing director of I.C.I. (Metals), a post he held until he retired in 1931.

Mr. Ambrose Hopper

Mr. Hopper played an important part in the progress and development of many of the non-ferrous metal trade associations and after his retirement took an active interest in local and county affairs, serving for three years as a member of the Warwickshire County Council.

He sustained a sad loss last May in the death of his son David, who was in charge of Sheffield Area Office.

PLASTICS DIVISION

'Luron' Angling Competition

A nation-wide competition for amateur anglers using I.C.I. 'Luron' fishing tackle has been organised to begin in April 1950. The competition will continue until March 1951, and a prize of £20 will be awarded each month to the angler using 'Luron' tackle who lands the fish of the month. There will be a prize of £5 for the runner-up.

Brown trout have been chosen for April and May, the first two months of the competition, followed by tench in June and sea trout in July. Then comes August with flat fish and September with bass, followed by perch in October, roach in November and pike (spinning) in December. The competition extends into 1951 with pike in January, rounding off with salmon in February and March. The judge will be the well-known angling authority, artist and writer Mr. Alex Jardine, who will be advised and assisted by a small committee headed by Capt. L. A. Parker, the famous Avon fisherman. The prize will be awarded for the specimen fish of the month, not necessarily the heaviest.

Posters announcing the competition have been widely circulated, and entry forms and details of rules are available

from angling club secretaries, tackle dealers, and the organisers of the competition, Imperial Chemical Industries Ltd., Plastics Division, Welwyn Garden City, Hertfordshire. The competition is open to all amateur anglers in the British Isles, and all catches made on 'Luron' casts or lines will be eligible for consideration provided they are properly vouched for. The attesting authorities may be any of the following:

> The secretary or any other official of an angling club. A keeper of a private fishing or ticket water. A tackle dealer or person authorised to issue rod licences. The attesting authority will be asked to certify that the weight, date, and details of the catch are correctly stated. The entrant will be required to give, in addition, the name of the retailer from whom the 'Luron' tackle was bought.

'Luron' fishing tackle is made from nylon monofilament and in addition to being very strong withstands prolonged immersion and, unlike gut, can be put away wet.

A 'Perspex' Beehive

An experimental beehive made of 'Perspex' is being tried out for beekeeping at Kongwa in East Africa as part of an attempt to solve the problem of pollinating thousands of acres of sunflowers sown in connection with the groundnuts scheme.

The hive is of a new type known as the International Unit Hive, and because of its simplicity and lightness of construction can be moved as easily as a suitcase. Yet despite its compactness it contains the same amount of space as the complex British hive with brood-box and supers. A swarm was introduced into the new hive last July, and since then the bees seem quite unperturbed by the transparency of their new surroundings.

SALT DIVISION

A New Chairman

On 1st February Mr. C. R. Prichard succeeded Mr. W. M. Inman as chairman of the Salt Division Board, from which Mr. Inman has resigned. Our correspondent writes:

"The news of Mr. W. M. Inman's resignation was received with great regret throughout the Division. Mr. Inman had been with us three years, during which time he endeared himself to everyone by his sympathetic interest in their welfare. Only a man of his temperament could have accomplished so much in so short a time, and the gratitude of all goes with him. Although he has left the Division we feel sure that we shall have his continued friendship and good will.

Mr. C. R. Prichard

"With Mr. C. R. Prichard, who succeeds Mr. Inman as Division Chairman, we hope our association will be a long and happy one. He has been a member of the Alkali Division Board since March 1943, and was appointed a joint managing director in November 1945. He began service with the Company when he joined Brunner, Mond and Co. in 1926 after taking a first-class honours degree in Chemistry at Trinity College, Oxford. He was with the Alkali Division first as Junior Plant Manager for a short period and then in the Research Department. In 1930 he was transferred to the Techno-Commercial Department, where he remained until the outbreak of war in 1939. During the war Mr. Prichard served in the R.A.F., attaining the rank of wing commander."

Mr. Albert Harrison

A family association with Stoke Works extending back for nearly a century was broken with the retirement on 24th February of Mr. Albert Harrison, who had himself been at the works for more than fifty years.

Like his father before him and most of his six brothers, who have also been to work at Stoke, Mr. Harrison started work in the mill. This was as far back as 1898. Two years later he was transferred to the Wagon Department, where he remained for the rest of his service. For the last twenty-two years he has been employed in light repairs on the sidings.

Mr. Tom Dean

The death is recorded with deep regret of Mr. Tom Dean, Works Engineer at Stoke Works, on 18th February after a long illness. Our correspondent writes:

"Tom Dean came to Stoke Works from Winsford on 6th September, 1943. He had already won a great reputation, and all he did only served to increase it. Moreover a warm, generous nature speedily endeared him to us all.

"Faced with many awkward engineering problems, he tackled them all with that courage, quiet assurance and calm confidence which were typical of him. However difficult the job, his meticulous attention to detail, great patience, dogged determination and wide practical experience combined to overcome the seemingly insuperable.

"But considerable as were his achievements in practical matters, it was his everyday association with all and sundry which will be most warmly remembered. Tom Dean was a kind man. His kindness was born of a ready sympathy and a desire to understand and alleviate the troubles of all his associates whatever their status. To this end he brought a spirit of spontaneous co-operation which was comforting, refreshing and invigorating. These qualities won for him the high esteem of his workmen, one of whom, when informed of Tom's death, said: 'He was the nicest chap I ever knew. There was no one else quite like him.' "

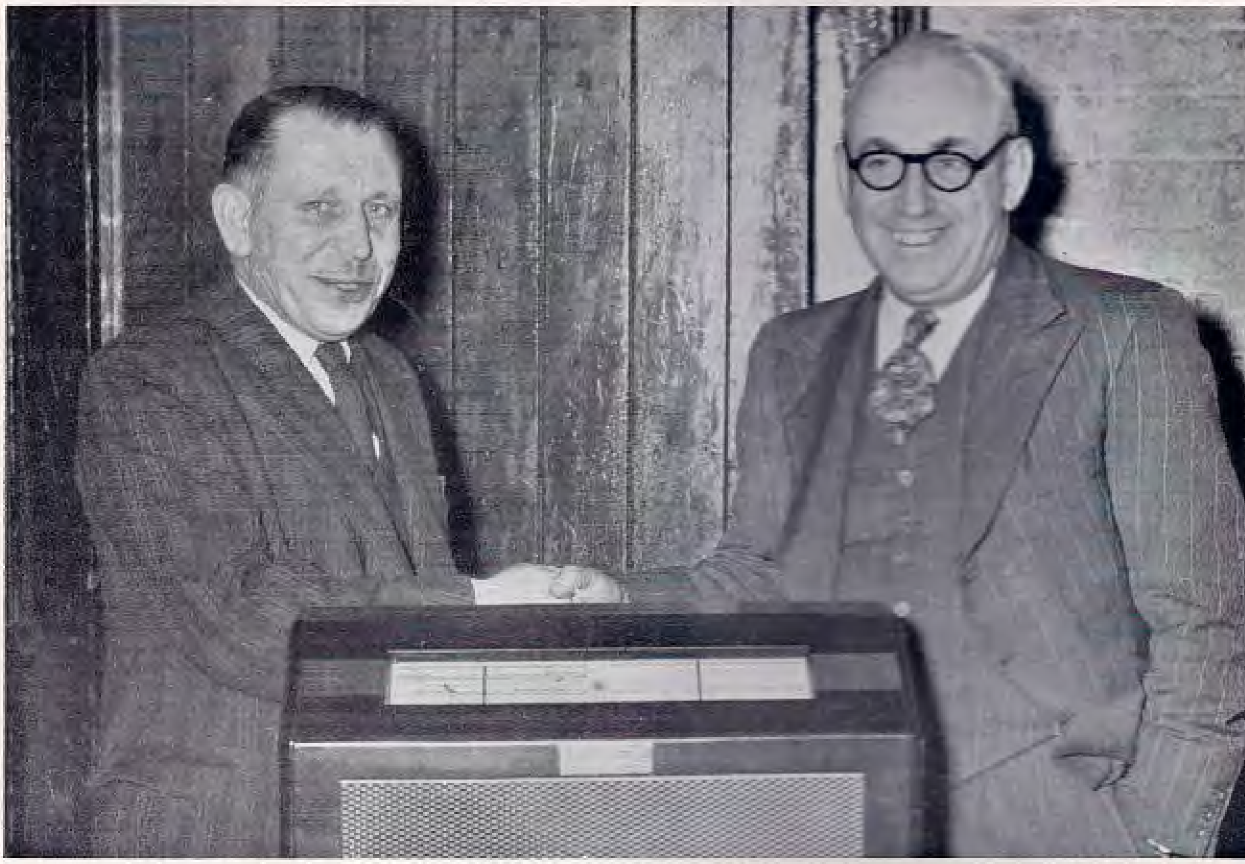
Mr. F. W. Clark

The death occurred on 3rd February of Mr. Frederick William Clark, who retired from the position of chairman and managing director of The Salt Union Ltd. when it was taken over by I.C.I. in 1937.

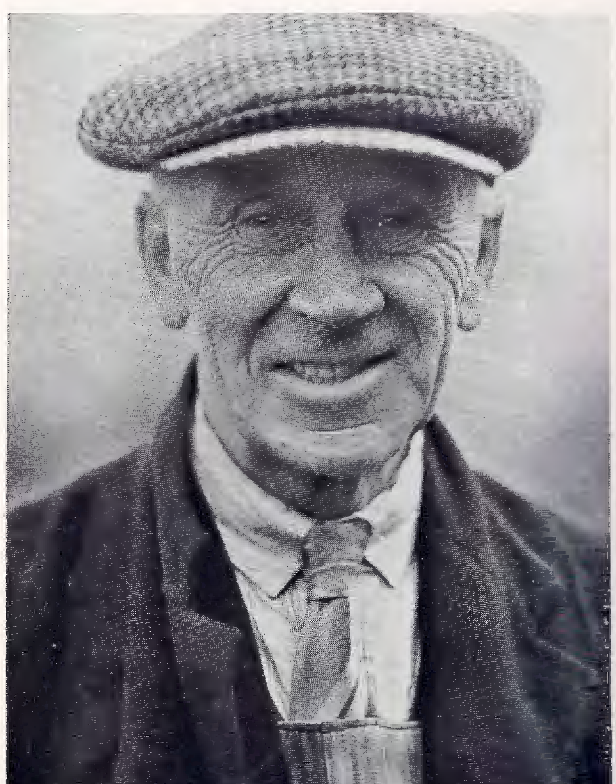
Mr. Clark joined The Salt Union in 1894, and after serving for several years as sales manager became managing director in 1913. One of his most important achievements was the formation in 1915 of the Salt Manufacturers' Association, which for a long period brought prosperity to the whole salt industry. He was chairman of that Association from 1915 to 1925.

Mr. R. Yearsley

To mark the completion of 25 years' service as secretary of the Winsford Branch of the National Farmers' Union, Mr. Robert Yearsley, Supply Manager of the Salt Division, was presented with a radio set at a special meeting of the branch on 7th February. In making the presentation Mr. W. Garnett, N.F.U.



Mr. W. Garnett, N.F.U. Secretary for the County of Chester, presents a radio set to Mr. R. Yearsley (right)



Mr. H. Atherton

Secretary for the County of Chester, spoke warmly of the loyalty and efficiency with which Mr. Yearsley had carried out his duties throughout his long term of office.

Outside his work for the Company, agriculture has always been Mr. Yearsley's greatest interest, and during his leisure he has acquired a deep understanding of farming problems. In this he has been helped by the close connection of his family with farming. His father, Mr. Robert Yearsley, now in his eighty-sixth year, was before his retirement a well-known Cheshire farmer, and four of his brothers are also farmers.

Mr. Yearsley's services to the community were publicly recognised in December 1948, when he was appointed to the bench of the Cheshire County Magistrates.

Salt Fleet Captains Retire

Their many friends at Winsford have recently said good-bye to two old and trusted servants of the Company, Mr. Herbert Atherton and Mr. William Postles, who have both served for many years as captains in the Salt Division's fleet operating on the river Weaver.

Mr. Herbert Atherton, who retired on 31st January, worked for the Company as a waterman for 50 years. He served his apprenticeship on the *Argosy* under the captaincy of his grandfather, the late Alfred Atherton. After sailing with the *Natal*, *France* and *Decempedes*, he succeeded the late Mr. John Verdin as captain of the *Natal*, being promoted to the rank of captain. His fellow watermen presented him on retirement with a pair of bowls.

During his 48 years' service Mr. William Postles, another captain of the Salt Division's fleet, who retired on 31st December, sailed with the *Russia*, *Syria* and *Antigua*. The name of Postles, like that of Atherton, has long been associated with the Weaver. William Postle's father was an engineer on the Company's craft, and his brother Harold was for some time the secretary of the Weaver Watermen's Association.

I.C.I.A.N.Z.

Mr. H. G. Darling

The death is recorded with deep regret of Mr. H. G. Darling, a director of I.C.I.A.N.Z. and chairman of Broken Hill Pty. Co. Ltd. He died on 26th January at the age of 65.

Mr. Darling was born and educated at Adelaide, where he succeeded his father as head of a firm of grain merchants. During the 1914–18 war he was a member of the Advisory Committee to the Australian Wheat Board and in 1927 was appointed a member of the committee set up by the South Australian Government to advise it on matters of state finance.

He joined the board of I.C.I.A.N.Z. in April 1937, and his wide experience and sound judgment were of great benefit to the Company. Moreover, an amicable and co-operative personality made relations with his colleagues uniformly pleasant and helpful.

I.C.I. (EGYPT)

Basketball Championship

For the third year in succession the I.C.I. (Egypt) basketball team has won the "non-federated players" tournament cup presented by the newspaper *La Bourse Egyptienne* to the best basketball team from the business houses in Cairo.

The team was formed in 1935 and reached the finals for the first time in 1944. After playing in two more finals it succeeded in 1947 in winning the *Bourse Egyptienne* cup, beating the famous *Bourse Egyptienne* team. This success was repeated in 1948, when the Cicurel Cup in the open tournament was won as well—a record for Cairo basketball teams. By winning the *Bourse Egyptienne* Championship again in 1949 the team have made themselves the permanent holders of the cup.

★ ★ ★

CORRECTION

The I.C.I. News paragraph "U.S. Scholarships" in the March issue of the *Magazine* gives the name of G. T. Parker (General Chemicals Division) as one of the nine men who received scholarships.

It is regretted that this information was given in error. The correct name is C. Vowles.

The I.C.I. (Egypt) basketball team

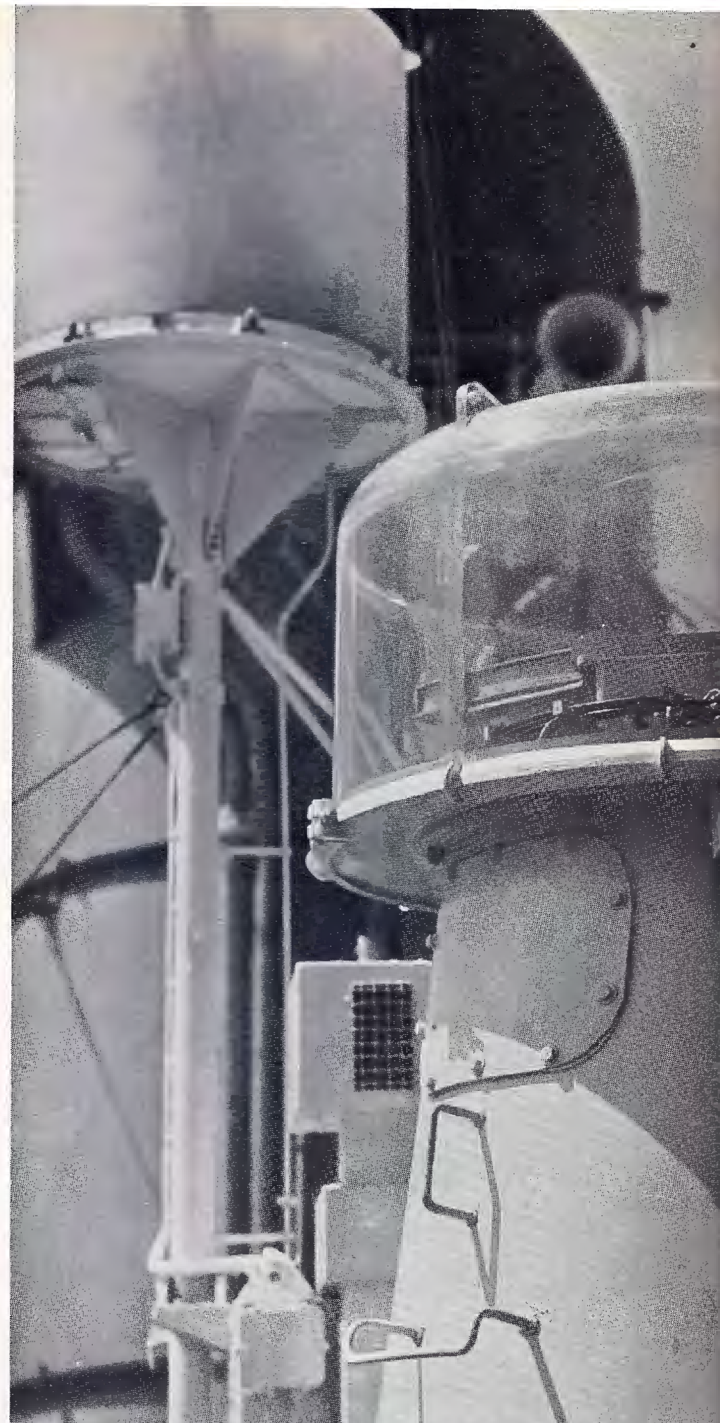
'ALKATHENE'

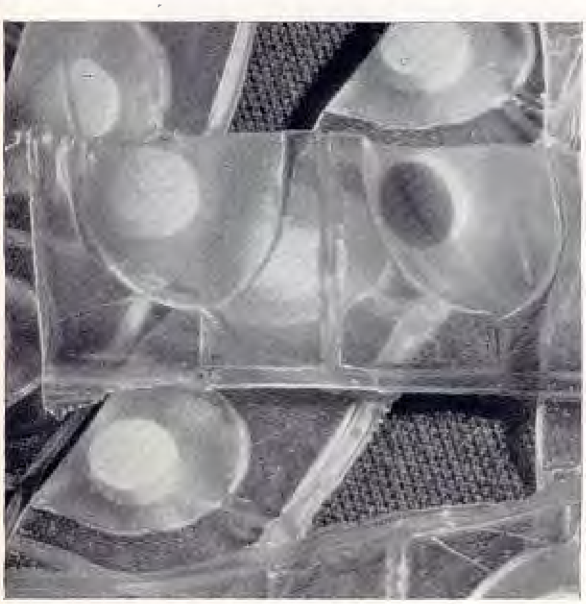
A Versatile Plastic

'ALKATHENE' is the trade name for polythene, the plastic manufactured by the Alkali Division at Winnington and sold in a variety of forms by the Plastics Division. It was discovered in the Winnington laboratories in 1933. Two physicists, R. O. Gibson and E. W. Fawcett, were investigating the effect of very high pressures on a mixture of benzaldehyde and ethylene. When the reaction vessel was opened after the contents had been subjected to a pressure of 30,000 lb. per square inch, Gibson noticed that the walls of the vessel were coated with a thin layer of a white, wax-like substance—polythene.

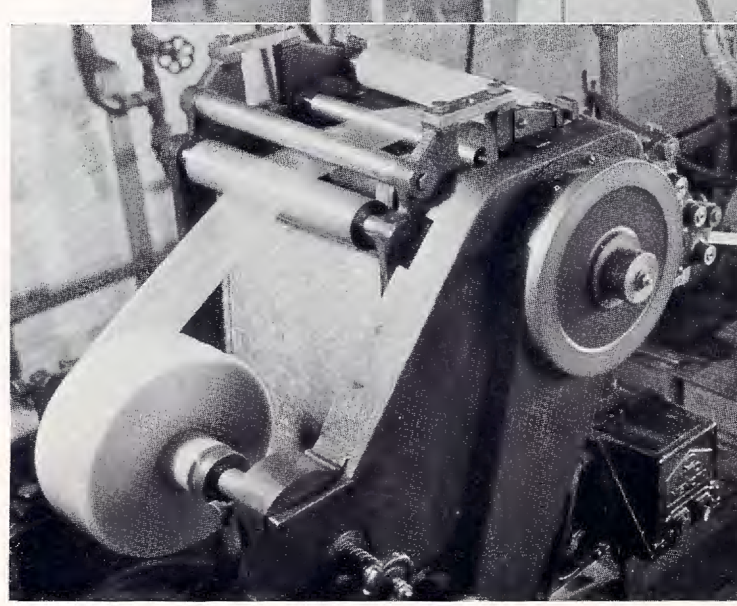
But although the new plastic could be made under laboratory conditions, because of the enormously high pressures involved—of the order of those generated when a 15-inch naval gun is fired—it was some time before 'Alkathene' could be made on a large scale. A very special technique had to be evolved from the combined "know-how" of physicists, metallurgists, chemists and engineers, and it was not until 1938 that the process of ethylene polymerisation had reached a stage where bulk production was possible.

The first full-scale manufacturing unit came into production at Winnington on 1st September, 1939—the day that Poland was invaded by the Nazis. Trial and research had already established that 'Alkathene' had excellent insulation properties in addition to being tough, water-resistant, flexible and light. In fact, it was an ideal material for the insulation of the cables used in radiolocation instruments. Radar was at this time in its infancy, but the development of 'Alkathene' as a cable sheath was one of the most significant contributions to the quick and successful application of radar to service needs; and there is no doubt that the wartime superiority of the radar of the Allies over that of Germany was very largely due to the research and production of I.C.I.'s Alkali Division. Of its contribution to victory Sir Robert Watson Watt, president of the Royal Institution, has written: "It transformed the design, production, and installation and maintenance problems of airborne radar from the almost insoluble to the comfortably manageable." These pictures illustrate some of its more important peacetime applications.





Moisture-proof 'Alkathene' wrappings for 'Paludrine.'

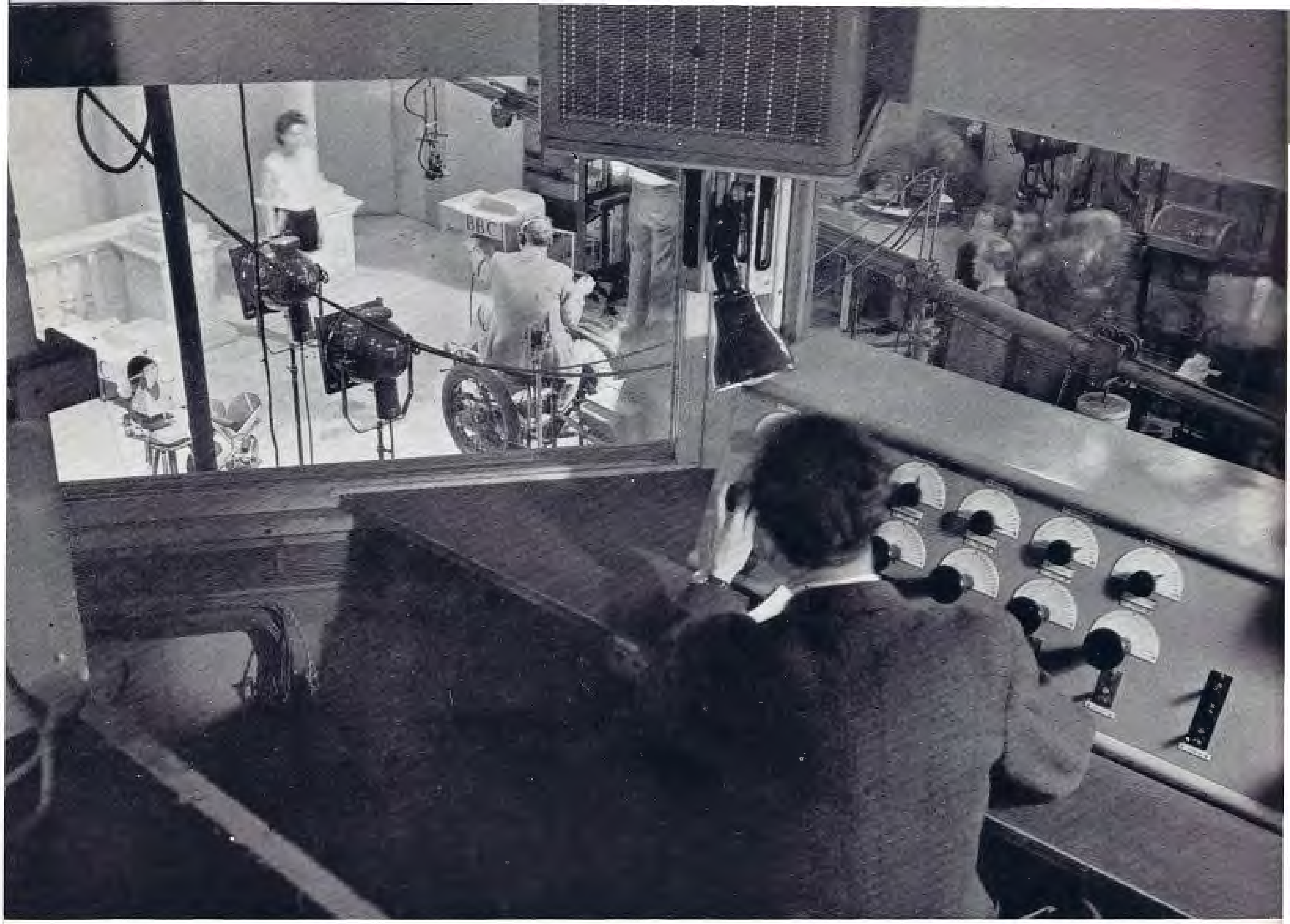


Extruded 'Alkathene' tape being wound on to spools.

(ABOVE) *A mechanic fits a 'Perspex' cover to the R.M.S.* Queen Mary's *radar equipment. Radar owes much of its success to the merit of 'Alkathene' as an insulating material. The discovery of 'Alkathene' proved to be a major factor in the development of radar, which now overcomes many of the perils of the sea.*

Ground Control Approach and the Instrument Landing System are now fully recognised methods of guiding aircraft. Some installations, as the new one at London Airport, can now "see" a plane 130 miles away or 20,000 feet up. 'Alkathene' is a very prevalent insulation for aerial bases.

The G.P.O. International Telephone Exchange at Wood Street, London. The number of conversations which the Anglo-Dutch submarine cable now carries at the same time has been greatly increased since 'Alkathene'-insulated cable was laid. Similar cable was used successfully during the Normandy invasion. (*By courtesy of the Postmaster-General*)



B.B.C. television studio at Alexandra Palace, London. Television is another invention for which manufacturers have found the insulation properties of 'Alkathene' invaluable. To overcome extreme sensitivity of T.V. apparatus to electrical interference, insulation must be superlative. As the range and scope of T.V. extend, so must the service be protected from unscreened electrical devices. To fulfil such needs the potentialities of 'Alkathene' are being very closely examined. (B.B.C. Photograph)

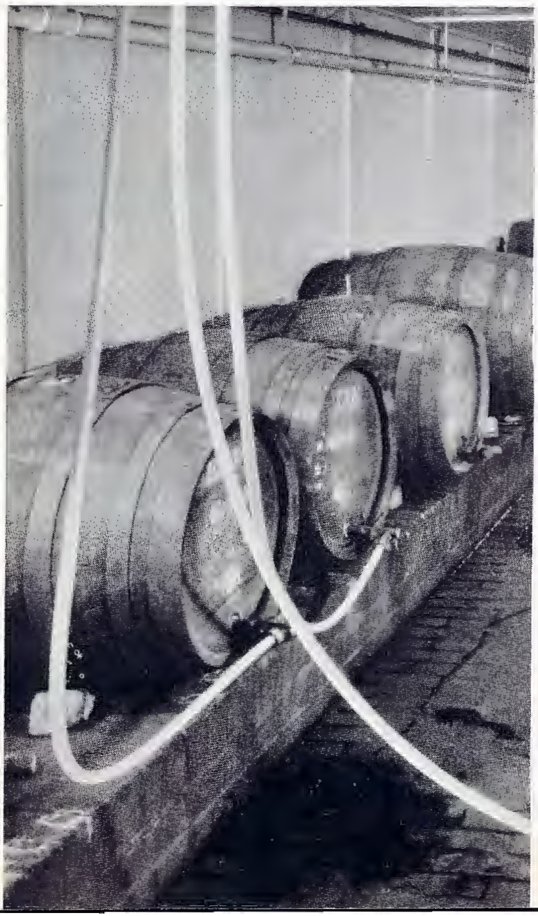
(RIGHT) *A welder completes the seam of an 'Alkathene' lining to a metal container. Another recent industrial use of 'Alkathene' is as a lining material for chemical plant and vessels. 'Alkathene' is markedly resistant to chemical action. Its attractions also include the ease with which it can be moulded, cut or turned to special shapes, given a perfect screw thread or welded.*

'Crinothene' is a form of 'Alkathene' sheet made by Plastics Division specially for lampshades, ladies' handbags and other items of domestic, decorative or personal use. Few craftwork shops will be found without examples of this very popular type of work.

(By courtesy of The Craftworker)

A mole-drainer uncoils 'Alkathene' tubing from a spool frame and pulls it underground through the headland of a field. Farmers are beginning to appreciate the worth of 'Alkathene' tubing for piping water to farm buildings and drinking troughs in the fields. Long, continuous coils of tubing, fewer joints, and freedom from winter bursts are outstanding advantages.

'Alkathene' is used for piping beer in breweries and public houses



Raw Materials of the Chemical Industry

SULPHUR, AIR, AND WATER

In ancient times air and water played parts of exceptional importance in attempts at explaining natural phenomena, for it was considered that all matter was composed of only four elements: fire, earth, air, and water. Later, when the ancient art of alchemy was beginning to develop into the precise science of chemistry, sulphur became of equal importance, for it was widely believed that all metals were composed of sulphur and mercury, the nature of the metal depending upon the proportions of each. Today these theories of the nature of elements are mainly of historical interest, but sulphur, air, and water continue to be of the greatest importance. It is on these three substances, together with coal, salt, and limestone, that the foundations of modern chemical industry are laid. From these six primary raw materials are derived, by complex transformations, such varied products as explosives, fertilizers, plastics, drugs, alkalis, acids, and dyestuffs.

Although the chemical industry depends upon the availability of very many different compounds, the absence of any of which would cause serious disorganisation, there is one which ranks above all others. This is sulphuric acid. Not only is the manufacture of this an industry in itself—world production is now about 15 million tons a year—but it enters into an extraordinarily large number of processes which are of fundamental importance to the chemical industry. It is used, for example, in making fertilizers, explosives, electric accumulators, rayon, pottery, and paper; in refining petroleum, sugar, metals, and rubber; and in a variety of technical processes such as tanning, process engraving, and electroplating. It is indeed difficult to think of any branch of the chemical and allied industries which does not need sulphuric acid for one purpose or another.

About one-fifth of the world's production of sulphuric

The interior of a sulphate of ammonia silo at Billingham

acid is used in the manufacture of agricultural fertilizers such as ammonium sulphate and calcium superphosphate. At Billingham Division, the principal product of which is ammonium sulphate, made at the rate of some 400,000 tons a year, sulphur is therefore of particular importance. There, the source of the sulphur is the mineral anhydrite produced from a mine lying beneath the works. Anhydrite is a natural form of calcium sulphate, and from the mines at Billingham three-quarters of a million tons of the mineral are taken every year. Anhydrite is also used for the manufacture of sulphuric acid, but most of it is converted directly into ammonium sulphate by treating a suspension of it in water with ammonia and carbon dioxide gases. Ammonium sulphate is also made from anhydrite at Prudhoe Works.

Billingham Division also manufactures sulphuric acid direct from elemental sulphur imported from Texas. The sulphur is first burnt in a stream of air, when sulphur dioxide gas is formed. This is then further oxidised to sulphur trioxide, which combines with water under suitable conditions to form sulphuric acid. This sulphur-burning plant was started only last June, but in a full year it will produce about 50,000 tons of sulphuric acid; this will be used for the manufacture of 'Perspex' and concentrated fertilizers, and for the making of titanium pigments by British Titan Products Ltd.

Sulphur is part of the composition of many important materials. Motor-car tyres, for example, are made from rubber which has been vulcanised by treatment with sulphur. The sulphonamide drugs, saccharin, certain dyestuffs, photographic "hypo," and mustard gas are sulphur compounds. Gunpowder, too, contains sulphur.

Air and water are so readily available—the one free and the other very cheap—that they are, perhaps, not generally thought of as raw materials of industry. Nevertheless they do in fact have many different uses as raw materials, and they are important constituents of many I.C.I. products. It is, indeed, no exaggeration to say that the Billingham factory was originally created to convert air and water into explosives and fertilizers.

During the first world war the German submarine blockade very seriously interrupted the importation from Chile of natural nitrates—then absolutely essential for the manufacture of all high explosives. Accordingly the government decided in 1917 to erect a plant at Billingham to manufacture synthetic ammonia, which could then be converted by oxidation into nitric acid. This process, known after its German inventors as the Haber-Bosch process, is of the greatest industrial importance. By making Germany independent of imported nitrates it enabled her to enter the first world war without fear of a serious shortage of nitrates for making explosives and fertilizers; it is indeed said that but for the incomplete development of the Haber-Bosch process Germany would have gone to war in 1913 instead of a year later. In the second world war too the Haber-Bosch process served Germany well. One factory at Oppau had a capacity of 150,000 tons per annum and a newer one at Leuna had a capacity of 500,000 tons, though probably this maximum was never reached because of Allied air raids.

In the event, the Billingham factory was not completed when the armistice came in 1918. In the following year it was acquired by Brunner, Mond and Co. Ltd., and shortly afterwards its development for the manufacture of artificial fertilizers and other heavy chemicals

(ABOVE) *A view of the Billingham factory, where large quantities of sulphuric acid are made.* (BELOW) *The mine beneath the factory which provides sulphur in the form of anhydrite, a natural form of calcium sulphate*

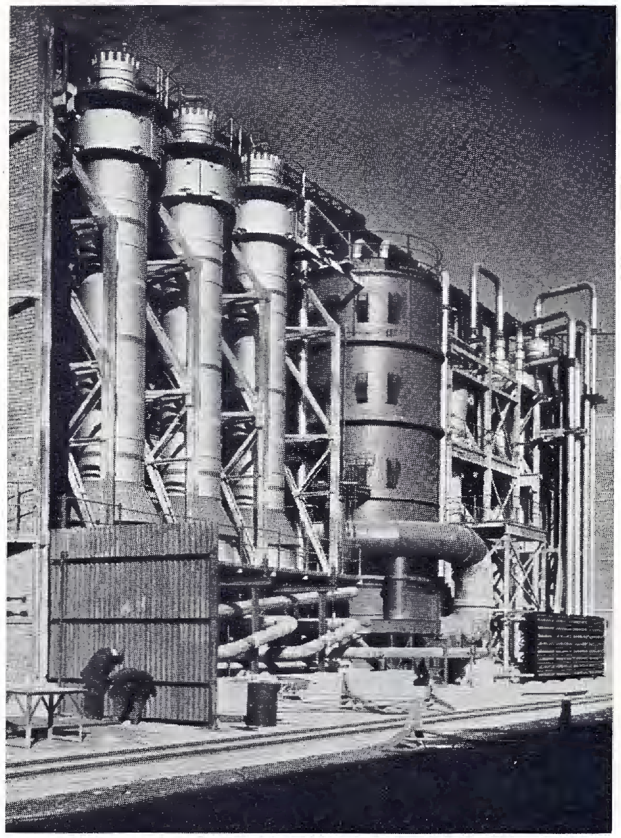
was put in the hands of a newly formed company, Synthetic Ammonia and Nitrates Ltd. This entered the I.C.I. merger in 1926 and eventually became I.C.I.'s Billingham Division.

Although the actual working of the process is very complicated, its principles are simple. When air is passed over hot coke it is converted into a mixture consisting mainly of nitrogen and carbon monoxide. The latter can be converted to carbon dioxide, which—as the common soda-siphon proves—can be dissolved in water under pressure and thus removed. By passing steam over hot coke it is converted into a mixture of hydrogen and carbon monoxide; this mixture is treated with steam, which converts the carbon monoxide to hydrogen and carbon dioxide, and the CO_2 is removed by absorption in water. Thus by alternately passing steam and air over hot coke, treating the carbon monoxide and removing the carbon dioxide from the products, a mixture of nitrogen and hydrogen can be formed. At very high pressures and a temperature of about 500°C., and in the presence of certain substances known as catalysts, the nitrogen and the hydrogen combine to form ammonia. This reaction takes place in tall steel vessels specially designed to withstand heat and pressure.

It will be seen that the whole of the ammonia found is derived exclusively from nitrogen of the air and the hydrogen of water. The production of ammonia is, however, by no means the end of this important process. It will be recalled that in making the nitrogen-hydrogen mixture large quantities of carbon dioxide were removed. One use of this has already been referred to, namely the making of ammonium sulphate by reaction between carbon dioxide, ammonia and anhydrite. It has other uses, however. Thus solidified carbon dioxide, marketed by I.C.I. as 'Drikold,' is an excellent refrigerant, being exceptionally convenient to use because it is much colder than ice and it turns directly into gas on thawing. 'Drikold' is used for preserving food, shrink-fitting metal parts, and for delaying the natural hardening of light alloys. Quite recently new possibilities have opened up for 'Drikold,' as it has been used with some success in rain-making experiments in Africa, the United States and elsewhere. If pellets of 'Drikold' are scattered from aircraft into certain types of cloud they can be induced to discharge their rain prematurely.

It was mentioned that in the making of synthetic ammonia the carbon dioxide was removed by converting it into water-soluble carbon dioxide. In fact, however, a small percentage of the carbon monoxide escapes this conversion and has to be removed in other ways. Good use can be made of this carbon monoxide, for by reaction with hydrogen it is converted into methyl alcohol.

In 1935 a hydrogenation plant for conversion of coal or creosote oil into petrol was opened at Billingham. Its capacity was 100,000 tons of petrol a year, and during the war it produced much-needed high-octane petrol for aircraft. Like the hydrogen required for ammonia manufacture, the original source of the hydrogen required by this plant is water.



A section of the Billingham Oil Works, where coal is converted by hydrogenation into petrol

Although the processes worked at Billingham depend very largely upon the use of air and water as primary raw materials almost every Division of the Company makes extensive use of both these substances. Thus Lime Division uses hundreds of thousands of gallons of water a year for converting quicklime into 'Limbux' brand hydrated lime; water is an essential constituent of certain types of paint sold by Paints Division.

One of the most important reactions in chemistry is that of oxidation, which in its simplest form means merely the addition of oxygen to a compound. This process makes possible many of the transformations which allow chemists to build up their complex products from simple raw materials. For example, alcohol can be converted by oxidation into acetaldehyde; if the latter is still further oxidised it is converted into acetic acid. Still more powerful oxidation converts acetic acid into a variety of products, generally carbon dioxide and water. Although such oxidations sometimes have to be carried out by means of special substances known as oxidising agents, they can often be made to occur merely with the help of oxygen in the air. Thus ammonia can be oxidised to nitric acid with atmospheric oxygen. The mould which produces penicillin utilises oxygen for the formation of substances essential to its growth. The oxygen of the air is therefore a most important raw material, and many I.C.I. products, especially those of Dyestuffs Division, have firmly locked up within them oxygen which was once part of the atmosphere.

The alchemists would no doubt be disappointed to know that their ideas of the natural roles of sulphur, air, and water were sadly wrong, but they would surely be gratified to know the immense importance these substances, which they studied so assiduously, have acquired in modern chemical industry.

The Story of a

LOCOMOTIVE CHIMNEY

By THE EDITOR

RECEIVED of Mr. Henry Maxwell, for one old engine chimney, and carriage on same to Wadebridge Station— £1 2s. 6d. So ran the invoice from the Mechanical Engineer's Office, Eastleigh, Hants. One old engine chimney! Was it possible that anyone could so refer to what had once adorned Dugald Drummond's masterpiece? Drummond, that rugged and tremendous personality, whose imprint yet lies clearly upon half the railways of Great Britain!

Dugald Drummond was as Scottish as his name, a rough diamond, lacking altogether in polish or grace, whose word was law and whose hand could be exceeding heavy. Born at Ardeer, near Ardrossan, as long ago as 1840, he served on the North British, the Caledonian, the London Brighton and South Coast, and finally the London and South Western Railway. Everywhere he went he made himself felt, not only as a personality but as a locomotive engineer, and it is a most curious fact that as the one he appeared to be the exact contradiction of the other. Drummond himself was rugged, rough and rude; awkward of speech and gesture; surly and, on the surface, unresponsive. Drummond's engines were the last word in elegance, refinement, harmony and grace. His designs were the most polished assuredly of the period, and his period, be it remembered, coincided with the heyday of steam.

With Drummond it was not a case of not suffering fools gladly—he was not prepared to suffer them at all. It was not unknown for him to rise to his feet, when interrupted by some inoffensive caller—whatever his importance in the railway hierarchy might be—and, thumping his desk, literally to bellow at him to be gone. He was no respecter of persons, unless they were qualified persons. He would reluctantly grant interviews and then refuse to receive his interviewers. He was a strict disciplinarian. Many an engine driver must have trembled when called into the Chief's presence to account for some infringement of rules.

The procedure was invariable. A reprimand for the first offence, the sack for the second. You certainly knew where you were. But despite his ruggedness and severity, he was liked as well as respected. He was fair, and he treated men as individuals. Perhaps his very strictness with them was something of a compliment—it showed that each one of them was important in his sight. Drunkenness—once common among enginemen upon the old South Western—was stamped out by Drummond immediately upon his arrival. He was intensely obstinate and very much of an autocrat. He liked the sound of the hooters of the Clyde steamers of his boyhood, and therefore installed the same hooters in place of whistles upon his railway engines. He objected, for some reason, to superheating and adhered in the face of all experience to a cumbersome installation of water-tubes across the firebox, which was manifestly less efficient. He had a certain fondness for gadgets, and devised a spark-arrester for his locomotives which certainly arrested the sparks but very nearly arrested the draught from the fire as well! He experimented with a fearsome contraption, which he called a double-single; it was supposed to ensure the free running of the single-driver with the increased adhesion of a coupled drive, but which in practice resulted in the two separate engines—for that is what they amounted to—getting out of step with each other and pulling against themselves.

But these were the mere eccentricities of a lonely man who had not the necessary contacts with his fellows to discover which of his ideas are idiosyncrasies. Beyond

Drummond built himself a most extraordinary little engine and saloon all in one . . .

question Drummond was a great man, and far the larger part of his designs were eminently sound and consummately successful: so sound and so successful that countless of his engines are still at work on the various railways for which they were built, not a few of them nearly fifty years ago.

Heavily bearded and lowering of countenance, with a thick knotted tie and a high stockade collar, he appears in his photographs rather like a surly old bear, while in one, in which he figures resplendent in the uniform of a major in militia, he is clutching his sword and gazing round, much as though he considered the moment opportune for dispatching a few of those who annoyed him.

Upon one occasion he upbraided his successor on the Caledonian, the talented and gentle-natured James McIntosh, for building, as he called it, unnecessarily large locomotives, well knowing all the time that he was hatching some far larger himself for the South Western, where he was then in command.

He removed the London and South Western's engine works from Nine Elms to Eastleigh in Hampshire, and then built himself a most extraordinary little engine and saloon all in one, in which he daily made the journey of some seventy miles from his home in Surbiton to the site of his new office. Who could imagine a similar thing being done today ? But at that time no one dreamed of questioning it. I think he could have built a whole train for his private use and got away with it !

Perhaps it was poetic justice that one who had scalded so many others should himself succumb to a scald. But so it was; an accident at his home at Surbiton necessitated the amputation of his leg, and the next day he was no more. The latest of his beautiful engines drew him upon his last journey to Brookwood in a special funeral train.

He was succeeded by his chief assistant, who, safe from that terrible supervision, set about refashioning the work of his chief. An apostle of simplicity, he made short work of the various gadgets and idiosyncrasies so dear to Drummond's heart. Mechanically this may have been to the good, but aesthetically the results were just lamentable, and first one, then another, classically beautiful type of engine suffered a hideous transformation as it was stripped of its ornamental features, its flowing flawless lines, and re-dressed in the aggressive angularities of what was really a foreshadowing of our wartime austerity.

And then the iconoclast turned his eye upon the huge express engine which Drummond had produced in the summer of 1912 to haul the heaviest of the Bournemouth and West of England expresses. Perhaps not the most efficient locomotive of its day, but assuredly one of the most beautiful and majestic! But here, providentially, his principles forsook him—or was it that he did not dare, even with Drummond dead, to execute so great a liberty? At all events, in this one instance his hand was stayed. Drummond's successor believed in plain stovepipe chimneys, the ugliest things ever witnessed. But when he came to design the chimney for that great express engine, to which he was giving a superheater in place of Drummond's firebox water-tubes, he produced a chimney of which Drummond himself might have been proud. Drummond's chimneys, indeed, were masterpieces. Nothing gives character to a locomotive more than its chimney. Imagine a French chimney on an English engine—it would look crazy! Imagine a Great Western copper-cupped chimney

on a locomotive of even another British railway—the London and North Eastern, let us say—and you will understand my meaning.

How well I remember the first time I saw this particular locomotive. The first world war was not yet over, and I found myself, as a schoolboy, at Exmouth, at the end of the little single-line branch from Exeter. I was a passionate railway fan, and the old South Western, upon which I had been born and bred, was my favourite of all lines. But at Exmouth one saw only small engines. No express engine ever strayed from the main line down the sleepy track to Exmouth, and I began to hanker for the sight of one of the giants which were to be seen at Exeter on the fast trains from London. Could we not pay a visit there to witness the arrival of the great train of the day, the 10.50 a.m. from Waterloo, precursor of the famous Atlantic Coast Express of later days ? I won my point, and one afternoon of early January, in what now seems those long-ago days, I found myself at Queen Street, as the South Western station at Exeter was then called, hoping, when the 10.50 should arrive, to feast my eyes upon an express engine of satisfying proportions.

I was tense with expectancy, but I had no idea at all of what I should see. In my mind there was just a vague conception of an express engine, something short-funnelled, powerful and imposing. I had not the least premonition that what I was about to experience would be one of the greatest thrills of my life. But the moment I caught sight of that great engine advancing swiftly towards me with the sunlight gleaming upon its mighty boiler, its scarlet buffer-beam, all the glory of that matchless London and South Western shade of green, my heart stood still. It was not only that I had never before seen such an engine. I had not any conception that such an engine could be. I had craved for something big and powerful, something that was unquestionably express. But this was the biggest, most tremendous, and withal the most beautiful machine that I had ever seen or would ever see. It took my breath away. I felt intoxicated. It seemed to me the sort of engine which might draw the corridor expresses of heaven ! So great was the height of the locomotive off the rails, so immense and imposing the boiler—the largest then in use in Great Britain—with the massive upswept saddle upon which it rested, that its chimney looked a mere excrescence, a lightly turned, airily seated coronet crowning that never-to-be-forgotten form. And such it always appeared on all the many occasions thereafter that I beheld it.

Time passed, and Drummond's successor was in his own turn succeeded. Further desecrations ensued. The whole outline of the engine was lost. Yet newer engineers appeared. And now, of all that magnificent ensemble, almost the only recognisable feature was the chimney. Suddenly I realised that unless I acted quickly it would be too late. It was in the middle of the great air raid of 15th May, 1941, the night that Hess arrived, that my resolution was formed. It gave me something pleasant to think about while the bombs fell. If the morning came, if I survived the night, I would write to the Chief Mechanical Engineer of the Southern Railway and ask if, when the time for dismantling should arrive, I might purchase the chimney that I had first seen all those years before at Exeter. It would serve as a memento of the engine and of the years.

To my surprise the answer was in the affirmative. Doubly in the affirmative, for not only could I purchase the chimney but I could purchase it there and then. Where to send it to ? Not to war-torn London, where it might be rescued from the scrap-heap only to be lost in the rubble-dump. I had some friends in Cornwall, smiling, ever-peaceful Cornwall, near Wadebridge, by the lovely Camel estuary. To them I wrote begging asylum for my treasure, and from them I heard extending welcome. The chimney, I had told them, was tiny—a mere knob on a great boiler, an elegant trifle which could be placed on one side in a room or cupboard. It would give no trouble. In due course I heard that it had arrived—and that it had taken four men to lift it ! Drummond's engines were massive affairs, as time has proved, but this was certainly a surprise. I travelled down to Cornwall to investigate. I have a photograph of myself, taken by my uncomplaining friends, standing by the mouth of the chimney. I could have stood in it just as well, and it reached nearly to my knees !

And there for the moment it remains, far far larger than life and naturally very heavy. But recently after much wandering I have a house and a garden again, and shortly, I hope, the chimney may make yet one further journey along the line which is so familiar to it and beneath the bridges under which it was wont to flash with such power and splendour in the brave days of old, to be installed upon a small column in my garden and there filled with flowers. Where was once all steam and smoke may soon be scent and blossom, and old Dugald's dour and doughty memory may perhaps be assuaged by this tardy tribute of affection. I should like to think so. One old engine chimney, indeed !

Information Notes

The steam tug Chieftain *and her companions manœuvre R.M.S.* Aquitania *to the shipbreaker's yard on the Clyde*

FAREWELL "AQUITANIA"

It would not be fitting that the passing of the veteran Cunard liner *Aquitania* should go unrecorded in the pages of the *Magazine*, for it was upon the *Aquitania* in October 1926, travelling back together from New York, that Sir Harry McGowan as he then was, and Sir Alfred Mond, later the first Lord Melchett, in six days of almost continuous discussion agreed upon the broad lines of the great merger which was to result in the formation of I.C.I. In a sense, therefore, the beautiful old liner is not only the grandmother of the Cunard fleet—a title that has sometimes been conferred upon her by the Press—but the grandmother of I.C.I. as well. Certainly none more gracious could be desired, for the splendid *Aquitania*, last of the great four-funnelled flyers which were the pride and wonder of the years before the Great War, was renowned throughout her long career of 36 years as "the ship beautiful." Indeed it may be doubted whether any vessel, large or small—with the solitary exception of the legendary *Mauretania*—has ever equalled the superb grace of this great lady of the Atlantic, the very embodiment of dignity and elegance, and all those virtues which have made the words "Clyde-built" a magic symbol the world over. Sad it is to think that that razor-sharp prow, that dreaming counter, that lovely rake of mast and funnel and all that perfect symmetry of sheer and line will be seen no more upon the deep waters.

UNIVERSITIES AND INDUSTRY: A COMMUNITY OF INTERESTS

By Dr. E. H. Rodd

Academic Relations Department, Dyestuffs Division

Readers of the newspapers will not have failed to notice that the Government has in recent years, especially since the end of the war, displayed much concern for the universities and has increased the parliamentary grant to these centres of higher education to many times the pre-war figure. It has realised the need, in a modern democracy, of highly educated citizens and technologists and of steady and growing effort in scientific research to keep this country going. Our own Company recognised a very long time ago how fundamental to the industrial welfare and technological progress of the country was the existence of active centres of research in our universities, where young scientists could be trained in the methods of research and whence new discoveries likely in time profoundly to affect the industries of the country and the life of the people were likely to come.

Very soon after the formation of I.C.I., which occurred in 1926, at the instance of the late Lord Melchett a Research Council was formed at which high officials of the Company conferred with leading professors of scientific subjects from our universities on practical means by which the Company could assist scientific research at university centres. As a result of this action grants were made to subsidise researches of special interest and, even more important, annual grants were made on a wide scale, especially to university chemical laboratories, for the purpose of purchasing equipment for research for which university funds were inadequate. These annual grants have been, and still are, of the utmost value to many university laboratories in spite of increased Government grants.

Research may be likened to digging for coal or some other mineral. The surface coal is easily won without many tools except pick and shovel; deeper coal requires more elaborate equipment—pit-shafts, hoists, steam engines, ventilation. To discover hidden seams requires a knowledge of geology and other sciences. So with research. Generally speaking, the less difficult work has been done, and further progress requires far more elaborate instruments and apparatus than the pioneers needed. Especially it needs scientists more highly trained and of wider experience, who therefore should be given a higher reward than the immediate post-graduate student on whom the university professor generally depends for collaboration.

In 1944 I.C.I. took a most important step to meet this last need. A large number of valuable fellowships—88, to be precise—were given, distributed among the major universities, to enable experienced scientists of proved ability to continue their researches at universities under reasonable financial conditions. The award and administration of these fellowships is entirely in the hands of the university to which they are given, without interference from the Company. It is already proved that the presence of the senior workers holding the fellowships in the university research laboratory can be a source of strength and an inspiration to younger workers.

The example set by I.C.I. seems to have been infectious, for several other large industrial firms have since come forward with generous assistance for university research.

Up to this point the general policy and practice of I.C.I. at the highest level have been considered. The Divisions themselves, however, have important reasons for wishing to see the universities run at a high state of efficiency both as regards teaching and research, and for keeping in contact with university staffs. The majority of the technical staff of the Divisions join the Company directly from universities and technical colleges, whether they be chemists, physicists, engineers or biologists, some joining immediately after graduation, others, especially the chemists, after trying their 'prentice hand at research. Different colleges produce different types of men, for university courses are not all moulded to one pattern, and it is important for the Division to know where to go for the type of recruit wanted.

The writer of these notes can speak with personal knowledge only of what the Dyestuffs Division has done to foster good relationships between the Company and the academic world. The broad object of scientific research as carried out at universities is to discover new knowledge concerning the physical world, while technological research applies that knowledge to the purposes of industry and eventually to the art of living. These two kinds of research have, however, much common ground and can reinforce one another to their mutual advantage.

In the several fields of science with which the Dyestuffs Division is concerned there is much in common between academic (so-called pure) and technological (applied) research, and this Division has as a matter of policy during twenty years made special efforts to throw bridges, as it were, across the gap which sometimes appears between the two. It is not, of course, a new thing for an industrial firm to make use of the services of academic gentlemen as consultants. We have engaged many of the leaders of academic research, men of international fame for their discoveries in science, in the service of the Division, but our attitude has been to consider them, not as "consultants" to whom to go when we are stuck with a problem, but as confidential partners in the exciting business of research.

Many benefits are discernible from the contacts thus brought about, once confidence has been achieved on both sides. Academic people have sometimes looked with disdain on technologists as unscientific experimenters, while the latter regarded academic people as unpractical dreamers wasting their time on matters of no importance. Such an attitude disappears when the curtain is taken down and each understands what the other is aiming at. Both sides acquire a broader outlook, a point of special importance since research tends to breed narrow specialists.

Those engaged in teaching should, from the nature of this work, tend to look at science in a different way from the industrial research worker and may see different approaches to a particular problem. On the other hand, their industrial contacts will bring to their attention new problems suggesting fundamental research which the industrial man is obliged to bypass. The experience of the Dyestuffs Division has been that even the busiest and most eminent professors, once they have fallen under the spell of Blackley, would not willingly break the connection on purely scientific grounds. At the same time the management can feel satisfied that their own scientific staff are in a position to discuss their work with acknowledged leaders of science whose knowledge and experience can be called on to augment their own.

One other important aspect, from the point of view of the Company's scientific staff, is that their contacts with academic people make their abilities known to a wider circle and enhance both their own prestige and that of the Company. The Company has a better chance of attracting to its service scientists of the highest grade if they can be made to feel that they are not, though serving in industry, debarred from acquiring honour and fame in their profession.

Much more could be written on the subject of I.C.I.'s relations with universities. Nothing has been said of numerous generous gifts by the Company to university expansion schemes; of gifts and loans of special apparatus which, in 1949, had a cash value of about £25,000; of day-to-day gifts of chemicals for research purposes by the Divisions; and of other grants and scholarships for special research. But enough has been said to demonstrate that I.C.I. recognises in the fullest degree the community of interests between universities and industry, and the obligation on industrial undertakings to give generous support to higher education and academic research.

CHEMICALS AGAINST FIRE

By Dr. J. Gordon Cook

Damage by fire costs us over £18 million a year in Britain. It is a major item on the debit side of our national balance sheet. And I.C.I. plays a big part in the continual struggle to reduce the loss of life and property caused by fire.

Fire is a manifestation of one of the commonest of all chemical processes. When something burns, it normally means that a chemical reaction is taking place between the burning substance and the oxygen gas in the air. The kitchen fire is a chemical reaction of this sort; air goes into the grate beneath the fire and then combines with the carbon in the coal to form carbon monoxide and carbon dioxide gases that disappear up the chimney. To prevent the fire burning we cut off the supply of air by closing the vents under the grate. And we use exactly the same principle to put out fires that have started accidentally. We prevent air from getting to the burning material.

The cheapest and easiest way of doing this is to cover the burning material with water. This puts out fires by both cooling the material and cutting off its air supply.

But a fireman's hose is not always handy, especially in private houses or small public buildings where a lot of wood has been used in their construction. Here a small fire can often be prevented from spreading and getting out of hand by an extinguisher of the soda-acid type. Here the contents of the extinguisher—water— are squirted out by the action of acid on sodium bicarbonate dissolved in the water. Alkali Division makes the sodium bicarbonate.

Unfortunately, water is not satisfactory for quenching all types of fire. Many fires today, for example, are caused by petrol. And petrol floats on water, so that it is not possible to prevent air from getting at burning petrol by covering it with water.

A common technique for dealing with such fires is to use a special foam instead of water. The bubbles of foam are able to float on top of burning petrol and so prevent the air from getting at it.

The familiar hand-operated extinguisher such as we carry on motor cars does the same job in a different way. The carbon tetrachloride inside the extinguisher is a non-inflammable solvent which, when squirted on to the fire, covers it with a layer of heavy vapour and keeps the air away. The brass body and cap are made by Metals Division, who also make copper "bottles" and light alloy containers for aircraft extinguishers.

The principle of smothering fires by a heavy gas or vapour to cut off the air supply is used in another way. Carbon dioxide gas is heavy and non-inflammable. Billingham Division make it for 'Drikold' manufacture. Directed on to a fire, the gas will lie over the burning material and stifle it.

One of Great Britain's fire risks is, of course, her coal mines. A number of I.C.I. products are used to minimise the danger. Much of the explosive used for blasting down the coal is sheathed with sodium bicarbonate: the heat of the explosion drives off carbon dioxide from this, which acts as a cool blanket between the gases from the explosion and any possible inflammable gases in the mine. Another source of fire and explosion is the coal dust floating in the air of the mine. An increasing tonnage of calcium chloride (made by the Alkali Division) is used for laying dust on runways and haulage roads. For this purpose it is often mixed with one or other of the surface-active agents made by Dyestuffs Division, which enables the coal dust to be more easily wetted. Finally the Brattice cloths, which are hung up outside coal mines to direct the flow of air used for ventilation, are fireproofed by soaking with this same calcium chloride.

In fire-fighting, prevention is better than cure. By treating inflammable materials with special chemicals it is possible to minimise their tendency to burn. Billingham Division, for example, make 'Faspos,' an ammonium phosphate compound used for fireproofing timber. The 'Faspos' helps to exclude the air needed to allow the wood to burn.

Paints Division make a fire-retarding paint, which does not itself catch fire like ordinary paint. It therefore remains on the surface of woodwork and prevents it from catching fire. Fire-resisting paints often contain sodium silicate—made by Alkali Division.

In addition to preventing inflammable substances such as wood from burning it is possible to use non-inflammable materials where there is danger of fire. Plastics such as P.V.C. will burn only with difficulty. Curtains, for example, made from Plastics Division's 'Welvic' minimise the fire hazard in aircraft or in cinemas and theatres.

Even Nobel Division is now taking a hand in fire-fighting. Their power cartridges—which have been used for everything from starting tractor motors to propelling toy aeroplanes—are soon going to provide the pressure that squirts water from fire extinguishers.

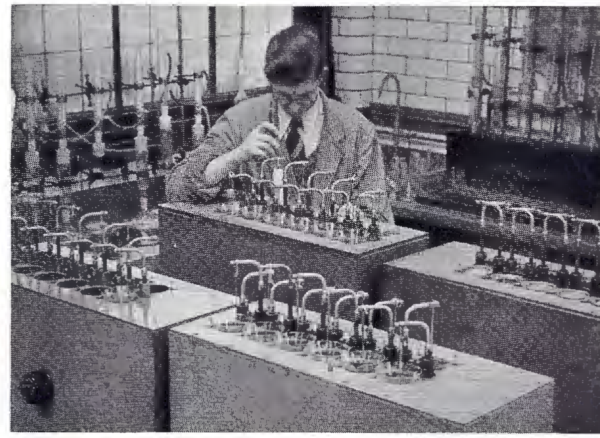
'TRANSPEX' INDUSTRIAL INSPECTION LENSES

Certain industries, particularly those in which operatives have to deal with very small components or with the adjustment of fine mechanism, are becoming aware of the need for visual aids to reduce eyestrain imposed by such close work.

Quite a low magnification is often sufficient to remove the discomfort and risk of possible permanent damage to the eyes, and single-lens magnifiers can be used for this purpose. Glass lenses are in use in some industries, but the series of 'Transpex' industrial inspection lenses, developed by the Plastics Division and incorporated in finished instruments marketed by several firms, have proved their value in those industries concerned with such things as printing, jewellery, radio, scientific instruments, ball bearings, clockmaking, electric lamps and many others.

The adjustable mounting of this 'Transpex' industrial inspection lens incorporates a fluorescent tube, which gives a high degree of shadowless illumination to objects under inspection

THE OLD METHOD: *Hand stirring to produce laboratory dyeings*



THE NEW METHOD: *Marney machines in the Blackley Dyehouse*

THE MARNEY DYEING MACHINE

New aids to efficiency are constantly being devised by ingenious brains. One of the latest is the Marney Dyeing Machine, designed by Mr. E. Marney of Dyestuffs Division, which enables test dyeings of different materials to be carried out mechanically and makes obsolete the traditional method in which such tests are done by hand-stirring, using small pots.

Twenty-four of these machines are now in use in the Dyehouse at Blackley. Each machine comprises a well-insulated twelve-hole stainless steel bath through which operate oscillating arms, each of which can be moved or stopped individually as desired. Heating is electrical, and is thermostatically controlled. The whole unit is transportable.

The Marney Dyeing Machine does not render laboratory dye testing foolproof, but all types of dyestuffs and all types of material, including wool and even leather, have at various times been processed. Generally, piece goods are more difficult than either yarn or loose material, but the machine is very adaptable, as instanced by dyestuff fastness testing and controlled scouring tests, which are secondary but nevertheless important uses.

THE STORY OF BLEACHING

Contributed by Technical Service Department
General Chemicals Division

Bleaching, like dyeing, is a craft which has been carried out for centuries with the aid of natural resources. Sunlight, rain and wind are nature's bleaching agents, but chemicals have brought speed and precision to bleaching operations, and today those industries which employ bleaching processes are important consumers of many I.C.I. products, particularly those of General Chemicals and Alkali Divisions.

Although bleaching is generally thought of in relation to textiles, many other trades use chemicals for bleaching purposes, an outstanding example being the manufacture of paper.

Textile bleaching processes vary according to the type of fibre from which the yarn or fabric has been made, be it cotton, linen, rayon, wool, silk, and so on. Generally there are two main steps in the process: first, treatment with an alkaline cleansing solution to remove oils, waxes, size, dirt and other impurities, and then treatment with the actual bleaching agent to remove residual colouring matter. The result is a clean, soft, white fabric which can then be dyed, printed or finished as required for the market.

The basic operations of the bleaching process were known in very early times, and the Ancient Egyptians, Romans, and Greeks were adept at bleaching fabrics, which in those days were generally made of linen. The alkali for cleaning was often crude "potash," derived from the ash remaining after certain plants were burned, but the use of lime was also known as far back as 300 B.C. Actual bleaching was carried out by exposing the linen to sunlight and air, while in the case of wool and silk the bleaching effect of fumes of burning sulphur was frequently utilised.

In the Middle Ages the Dutch developed an extra operation in which the linen was "soured" with buttermilk, but apart from this modification there was comparatively little change in textile bleaching methods until about the end of the eighteenth century.

Between 1750 and 1850 the textile industry was revolutionised by the introduction of power-driven spinning and weaving machinery, and the bleaching trade had itself to become mechanised to cope with the greatly increased production of cotton goods. The same period also saw fundamental changes in the bleachers' chemicals. Plant ashes were replaced by sodium carbonate made from salt by the Leblanc process; buttermilk gave way to hydrochloric acid, while the most striking change of all was the introduction of chlorine, which as a bleaching agent achieves in a few hours a whiteness hitherto obtained only after months of exposure to sunlight.

At first chlorine was employed in gas form. Then the Lancashire bleachers found that if it was absorbed in lime and water the resulting calcium hypochlorite solution had a gentler action and was more easily handled. In those days chlorine could not be transported, and so the bleacher made it for himself until the advent of bleaching powder, which provided a simple way of transporting chlorine and of preparing calcium hypochlorite solution by simply mixing the powder with water. For nearly a century bleaching powder held the field, but now that chlorine can be transported in liquefied form, many bleachers have reverted to the old method of preparing their bleach liquor from chlorine and milk of lime.

Also, in fairly recent years, sodium hypochlorite prepared by the chemical manufacturer has been increasingly used in place of bleaching powder. The change from sun bleaching to chemical bleaching was fairly rapid in the cotton trade, but with linen, which is a difficult material to bleach, "grassing"—in which the unbleached linen is spread out in fields in full sunlight—persisted for many years and is occasionally employed even today.

Changes in wool and silk bleaching were not so marked and sulphur stoving is still employed, although it has been largely replaced by peroxide, which gives a much more permanent bleach. Peroxides have also found a use in linen bleaching, and the alternate use of chlorine bleaching agents and peroxides is now standard practice.

The final stage in the evolution of modern bleaching technique is to be seen in the engineering improvements effected during the last hundred years. Massive pressure boilers, or kiers as they

are termed, were introduced for the alkali boiling operation. Sewing machines stitched the cloth lengths end to end, and the resulting "rope" of cloth was conveyed mechanically from one operation to another. Washing machines, automatic pilers, circulating pumps, power-driven mangles, drying machines and other devices completed the mechanisation, and special steaming plant has recently been introduced to make the alkali "boil" a continuous process.

In Britain mechanical and chemical developments more or less kept pace with each other. In India, however, mechanisation was slow, and for many years chemical bleaching was carried out by old-fashioned manual methods. The successful use of chemicals in the textile bleaching industry paved the way for the use of chemical bleaching agents in the laundry and in the home, with the result that sodium hypochlorite and peroxygen compounds are now widely employed.

Bleaching is comparatively new in connection with paper-making. The historic materials like papyrus, parchment and hand-made rag papers were employed in their natural colour, and it was only when chemical wood pulp was introduced in the middle of the nineteenth century that bleaching became widely adopted. Since then the production of paper has increased so much that, even under the present rather abnormal conditions, the British papermaking industry is a very large consumer of I.C.I. chlorine.

As papermakers' raw materials are short cellulosic fibres, it is only to be expected that the chemistry of their bleaching is essentially similar to that of cellulosic textiles like cotton. Calcium hypochlorite solution soon became the standard bleach, prepared at first from bleaching powder, but nowadays almost all papermakers buy liquid chlorine and inject it into milk of lime. Bleaching in the paper trade is usually a single-stage operation dovetailed between the pulping process and the actual papermaking. The required quantity of bleach liquor is added to the pulp, which is then agitated in "potchers" or pump-circulated through large bleaching towers. Newer processes which have been developed to deal with Kraft pulp often start with chlorine gas or chlorine water and finish off with ordinary lime bleach liquor.

As part of its technical service to customers the General Chemicals Division maintains at Runcorn a bleaching station where problems of the bleaching industry are investigated.

THE BLUE LABEL

Through Imperial Chemical Industries (Egypt) S.A. we have received the following note, written by the Chief Pharmacist at the Church Missionary Society Hospital in Cairo. She has recently returned from a visit to Gaza, where she was inspecting and reorganising the pharmaceutical facilities available to the 250,000 Arab refugees in that area.

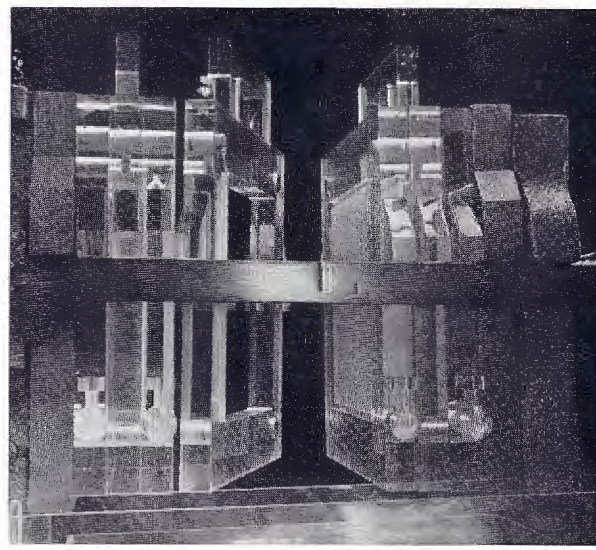
Round behind the big Crusader Church in Gaza, now a mosque, is a narrow lane of little shops and stalls. In one stood an old man with a long dark blue beard. I stood and stared. The tumbledown room behind him was dark, but as I watched he began to pump up an oil-burner, and then I saw a hand-made tank full of a dark blue liquid. Behind him two little boys were jumping on hanks of cotton soaking in shallow baths of water. "May your evening be happy!" I said. "May I come in?" Inside I sat on a box and replied carefully to his polite words and greeting. A large dried lizard hung over the tank and a very spiky aloe over the door. I looked round, expecting to see pots of herbs or shells or mysterious packets of dye. "Father, what do you use for dye?" I asked. With a beaming smile he went to the back of the room, pulled a loose stone out of the wall, and produced a shining blue tin, labelled I.C.I. "I always use the best dye," he said.

There are about a quarter of a million Arab refugees round Gaza being cared for by the Quakers. The Church Missionary Society does what it can to help, taking most of the major surgery cases in its hospital there. Often the theatre is going all day, and will start up again in the middle of the night. I.C.I. is there; a blue label again: 'Cetavlon.'

Out in one of the refugee camps women were waiting to go into the clinic. "Are you very ill?" I asked one. "No, praise be!" she said. "We are all waiting for the magic pills for our babies." I knew what she meant at once—Sulphaguanidine tablets. Later, I saw large tins of them in the central store: I.C.I. again.

SEEING IS BELIEVING: A TRANSPARENT FILTER-PRESS

A novel feature of this small-scale wash-type filter-press is that both the plates and frames are made of 'Perspex.' The 'Perspex' parts of the press were designed by the Trafford Park works staff of Dyestuffs Division and fabricated by Plastics Division.



A transparent filter-press: close-up showing the construction of the press plates in 'Perspex'

Large-scale filter presses of this type are generally made of iron or wood and are used either for removing solid impurities from solutions, in which case the filtered liquid or filtrate is retained and the residue discarded, or for filtering off dyestuffs, intermediate products, etc., from liquids. Provision is made in the press for washing the solid filter-cake of dyestuff or other material free from soluble impurities.

The main purpose of this "transparent" model filter-press is to demonstrate exactly what happens during filtration by this method and to study ways and means of improving our processes and products.

CHECKING CLOTHES MOTH DAMAGE

Contributed by Dyestuffs Division

Some time ago Dyestuffs Division introduced a mothproofing agent, known as Lanoc CN, which can be applied to wool as a preventive against attack by the caterpillars of clothes moths and carpet beetles.

These pests can be responsible for an enormous amount of damage to woollen garments that are put away for any length

of time, or to stored blankets, carpets, fur coats and so on. Contrary to common belief, it is not the moths which do the damage—it is their caterpillars which, by thriving on a diet of wool, produce those dismaying holes which are often the first evidence of the presence of "moth."

At present most households use either chemicals such as naphthalene (familiar as moth-balls) to repel the insects, or insect-killing dusting powders. Unfortunately both have their drawbacks: repellants, which have an unattractive smell, disperse into the atmosphere and have to be replaced at frequent intervals, and insecticides are removed from fabrics during washing. The best protection against attack by the caterpillars is to apply a lasting mothproofing agent such as Lanoc CN to the yarn or fabric during manufacture. This apparently—and fortunately—makes the wool fibre unpalatable to the caterpillars, and rather than eat any quantity of treated material they starve.

The Textile Finishing Section of the Dyehouse at Blackley maintains a thriving colony of "tame" clothes moths for experimental purposes. During the development of Lanoc CN the caterpillars were supplied with a varied diet of treated and untreated fabrics to test the efficiency of the new agent and of other similar compounds.

Lanoc CN, although colourless, is nevertheless a dyestuff, because it possesses that property known as affinity. It is fast to light, washing and dry-cleaning and has no effect on the shade or fastness properties of dyed materials. In appearance it is a pale cream coloured powder, which is dissolved in boiling soft water before being applied from an acid bath, in the same way that acid dyes are used.

NEW SELECTIVE WEEDKILLERS

By Dr. W. G. Templeman
Jealott's Hill Research Station

Since the middle 1930's it has become increasingly clear that the growth of a plant is controlled by the presence of minute concentrations of organic chemicals in its sap. These compounds are named plant hormones, though they are also called auxins, growth-substances or growth regulators.

Most people know that a growing plant shoot will turn toward the light, and it is generally believed that this is due to "hormone" effects; similarly, it is these hormones which cause the shoot to turn upwards and the root downwards if a seedling is held in a horizontal position. Again, the dormancy of side buds when the leading shoot of a twig is growing vigorously, and the swelling of fruit after pollination, are now believed to be chemically controlled.

Only one natural hormone (3-indoleacetic acid) has been adequately investigated. Because it is a relatively simple substance organic chemists have been able to make many related chemicals, and quite a number of these act upon plants in the same way as the natural product. The high biological activity of these compounds can be appreciated from the fact that if applied in the appropriate way, one ounce of the natural hormone mentioned above is sufficient to cause a "bend" of ten degrees in 700 billion young oat shoots. It is also not surprising that such active chemicals, when applied externally to plants, cause profound effects on their behaviour. Their ability to induce plant cuttings to root freely is utilised in the Plant Protection Ltd. product 'Hortomone A.'

Studies which began at I.C.I.'s Agricultural Research Station at Jealott's Hill in Berkshire in 1936, aimed to discover if any of these synthetic chemicals could be used to increase the growth of valuable crop plants, led to the discovery in 1940 that, by suitably adjusting the dose of the active ingredient of 'Hortomone A' when this was sprayed on to the foliage it was possible to kill some plants without harming others. For instance, the common yellow-flowered weed of cornfields—yellow charlock—could be completely destroyed without damaging the corn. In these earliest experiments, made in pots, some 10–25 pounds per acre of active agent were required, but they established a new principle of selective weedkilling. Chemists of the Dyestuffs Division Research Department at Blackley, led by Dr. W. A. Sexton, soon found materials ten times as potent, so that in 1941 'Methoxone'—the active principle of 'Agroxone' and 'Verdone'—was born.

Extensive field trials were undertaken and the usefulness of 'Methoxone' for destroying a variety of weeds harmful to cereals (such as charlock, wild radish and pennycress), grassland (buttercups and creeping thistle) and lawns (plantain and catsear) was fully proved. For agricultural purposes only one to two pounds per acre of active principle are required, and even distribution is achieved either by spraying it in solution or by using a dust in which the 'Methoxone' is diluted in an inert "filler" such as ground chalk or limestone.

Besides 'Methoxone,' another selective weedkiller, popularly known as 2,4-D, was discovered in 1942 and is well known abroad as 'Fernoxone.' It was independently discovered in America during the war and is similar to 'Methoxone' in its effects. Yet another, called IPPC, was found by Dyestuffs Division and Jealott's Hill during the early years of the war; this chemical will particularly prevent the germination of many grasses when put on the soil soon after cultivation and before any seedlings have emerged. It is not yet in commercial production in this country.

By eliminating weeds these selective killers increase the yield of grain and forage. Some hundreds of thousands of acres of cereals were dressed in Britain last year, while in North America the figure was in the neighbourhood of the ten million mark. Developed by Jealott's Hill and Dyestuffs Division, 'Agroxone' is now manufactured by the General Chemicals Division; Lime Division is concerned in the preparation of the dust, and Plant Protection Ltd. are responsible for marketing it and the related 'Fernoxone' at home and in many overseas territories—a truly combined operation.

FERROUS SCRAP

Figures now available show that in 1949 I.C.I. despatched a total of 43,048 tons of ferrous scrap, almost 1000 tons more than in 1948.

The British steel industry achieved a record output over 1949. It should be remembered, however, that it had to import a large quantity of scrap from Germany for which it had to pay a very much higher price than for home-produced scrap. The need for this country to save as much scrap as possible is as great as ever, so in I.C.I. the aim in 1950 is to beat the achievement of 1949.

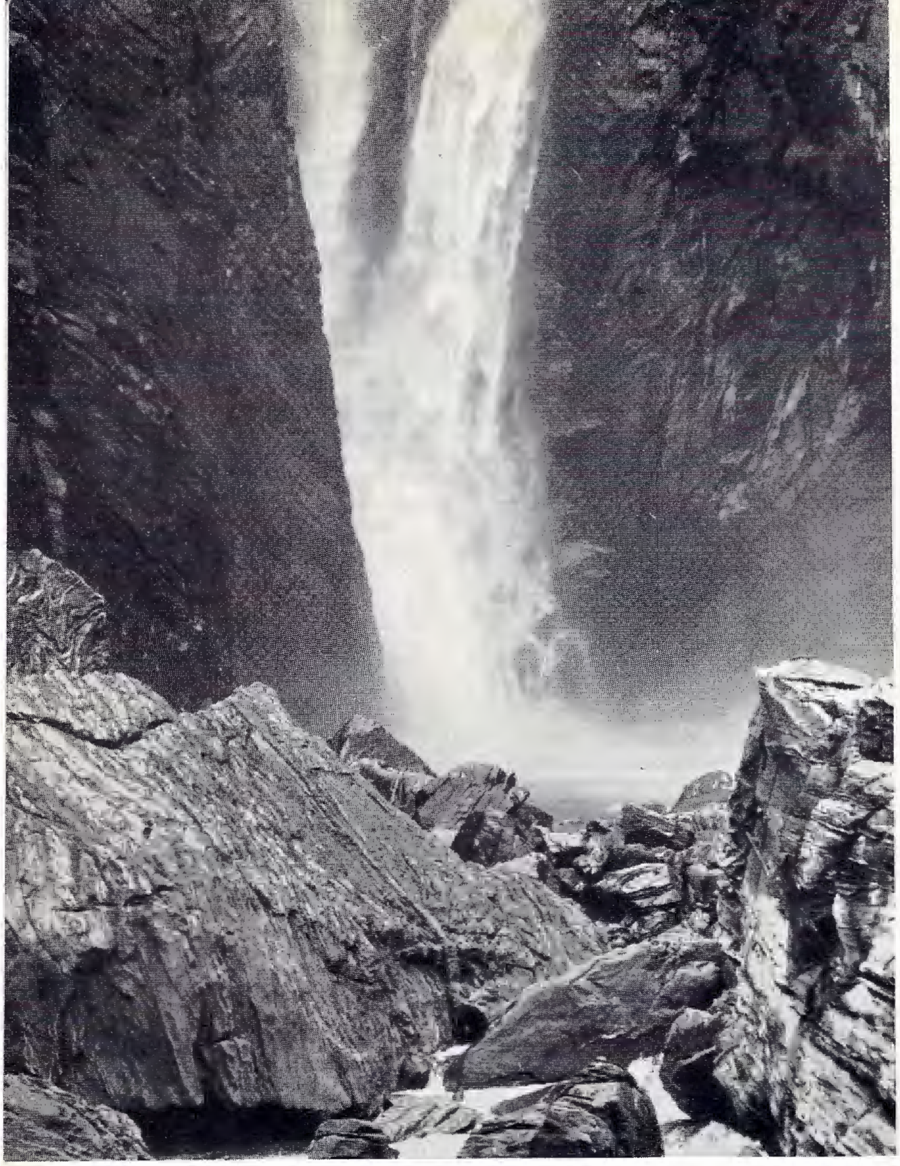
NON-FERROUS METALS: RESEARCH FOR INDUSTRY

The new laboratories of the British Non-Ferrous Metals Research Association in Euston Street, London, were opened recently. The reconstruction and occupation of this laboratory block, which was destroyed by bombs in 1940, completes a stage in the provision of research facilities to meet immediate needs.

The British Non-Ferrous Metals Research Association is a national organisation of some 350 producers, manufacturers and users of non-ferrous metals. It is financed by annual subscriptions from members and a grant from the Department of Scientific and Industrial Research. Its main objects are to assist its members in technical problems, to carry out researches into various aspects of non-ferrous metals and alloys, new scientific developments and techniques, and to keep members abreast of the latest information about new discoveries and improved methods. Naturally, at the present time, emphasis is on those scientific developments and applications most likely to increase productivity.

Sir Arthur Smout, I.C.I. group director responsible for the Metals Division, is a vice-chairman and member of the Council, and Dr. Maurice Cook, a director of the Metals Division, is a member of the Council and chairman of the Research Board.

PICTURES FR
INDIA AND PAK



The hydro-electric station some miles below the falls was planned and erected by Indian engineers.

MYSORE

THE JOG FALLS, *a magnificent waterfall with its sheer drop of* 900 *feet, is one of the finest sights in India.*

I. SOUTHERN INDIA

Observance of the law.

BOMBAY
A pleasure cruise in Bombay's fine natural harbour. It is well equipped with docks, and is the nearest Indian port to Europe.

THE ARAB DHOW *carries the bulk of the coastal trade all over the Arabian Sea from East Africa up the Persian Gulf and along the western coast of India. Its rig is very characteristic of sailing vessels east of the Mediterranean. When one has to go about, it is necessary to take the sail down and re-rig it on the other tack.*

II. NORTH-WEST PAKISTAN

JHELUM

(*Left*) *The Jhelum river comes down from the snow-covered mountains of Kashmir, which can just be seen in the distance. Jhelum is an important military cantonment of the Pakistan army. Alexander the Great fought a battle to cross the river when he invaded India 2275 years ago.*

KHEWRA

(*Right*) *This remote place in the Western Punjab is the site of the soda ash factory which Alkali Division planned and erected for the Alkali and Chemical Corporation of India during the war. A British community of about twenty strong lives on the estate.*

At the height of summer Khewra is one of the hottest places in India, and the workers are forced to live in the hills. The right-hand photograph shows their summer dwellings.

III. IN THE HILLS

SIKKIM

The famous view from Sandakphu (11,930 *feet*) *is one of the finest mountain panoramas in the world accessible to an ordinary tourist. The view includes Mount Everest and many others of the highest peaks in the world. The peak in the centre is Kangchenjunga, the third highest mountain in the world* (28,146 *feet*). *It is* 43 *miles away.*

DARJEELING

(*Left*) *I.C.I.* (*India*) *Ltd.'s distributor in the bazaar;* 7000 *feet up, it may well be the highest place in the world where I.C.I. goods are sold over the counter.*

KABRU

A native footbridge of bamboo, built in accordance with the best engineering principles.

(*Right*) *A mountain of over* 24,000 *feet in height, and one of the highest peaks in the world to have been climbed. The smoke of a great forest fire covers the valleys below.*